DECEMBER, 1955 Vol. 44, No. 10

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

PRE-CONVENTION NUMBER

IT ALL DEPENDS . . .

The substance in the picture looks in part like coal and in part like tar. As a matter of fact, it can be further processed into oil and gasoline and chemicals of many kinds. For the "what is it?" of any substance depends on the influences to which the substance is exposed.

The same question, "What is he?" can be asked about any lad in a classroom but the answer will not be found until later in life when his nature and character will be the sum and substance of all the influences that have been brought to bear on his original potentialities which are great and inexhaustible.

That is why conscientious educators are constantly on the alert, seeking the influences they can use in shaping the lads in their classrooms . . . and seeking to *apply* the influences in the right and proper way at the right and proper time.

At the beginning of a school year, the first assembly in class, much depends on what the educator does. No competent instructor in mechanical drafting will make the mistake of compromising the boy's interest in the work, nor the respect in which it may be held. No such instructor will permit mere economy to dictate the purchase of cheap and shoddy drawing instruments. For here is an influence that does not exhaust itself in a day or a year but can reflect itself into the boy's mind throughout all the years to come. Here may be one of the most important decisions pupil and teacher may ever make: *which drawing set?*

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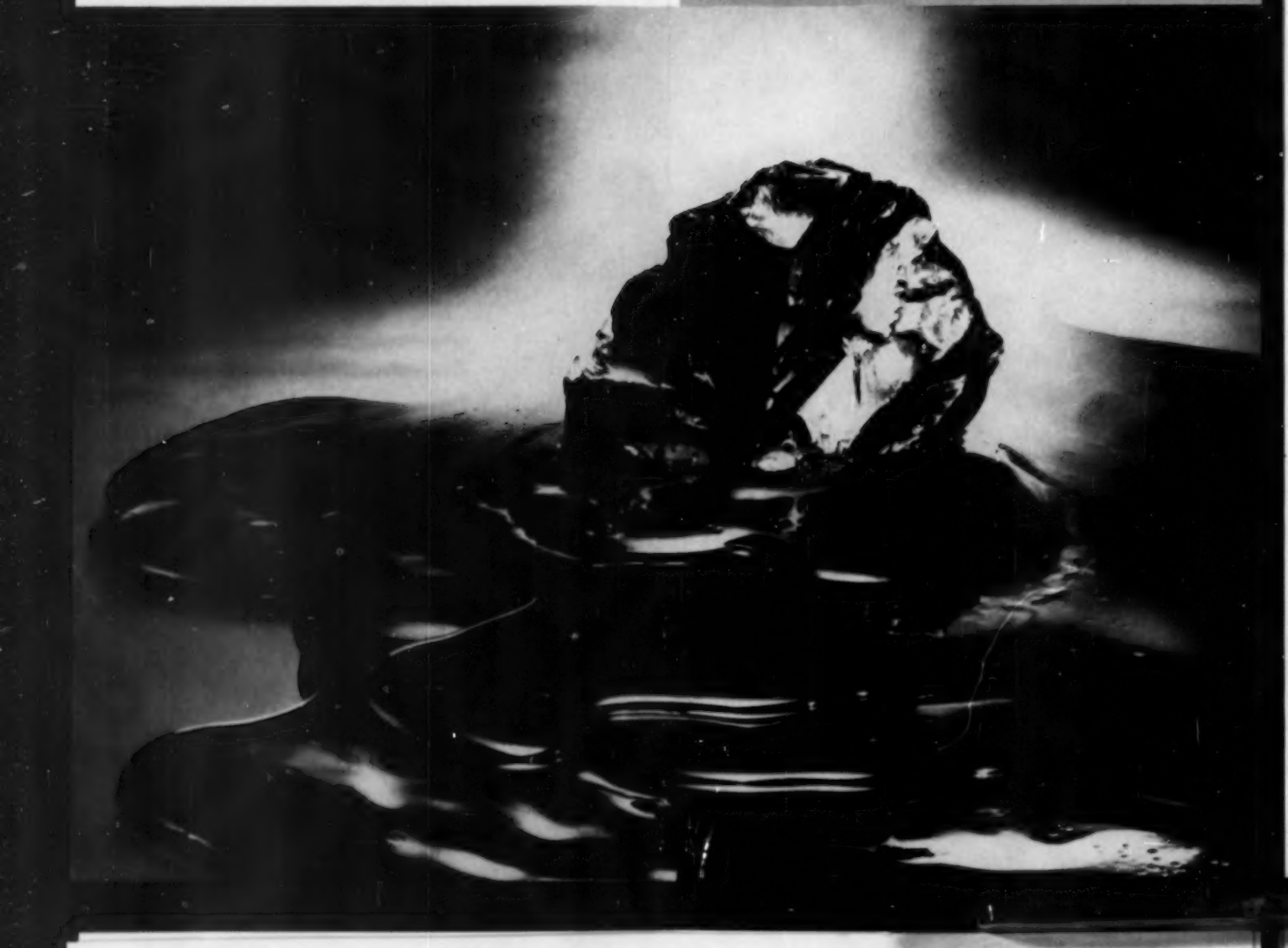

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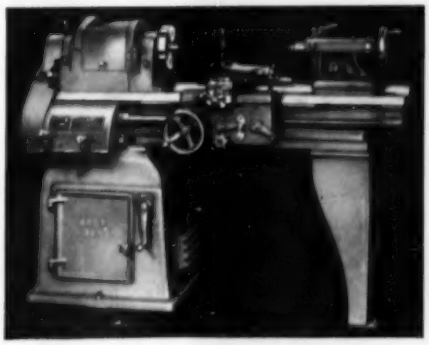
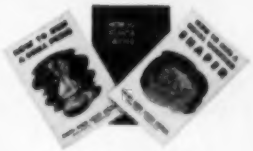
Built-in automatic safety devices make it impossible to damage the lathe by engaging two opposing feeds simultaneously. Belt drive to the spindle assures smooth, quiet operation and helps absorb shock if work or carriage stalls. Simplicity of design contributes to the sturdiness of the lathe and makes for an ease of operation which enables students to become proficient with minimum instruction.



South Bend 14½" x 5' Quick Change Gear Lathe — f. o. b. factory, less electrical equipment, $1809.



Teaching Helps

Instructional material to make your teaching easier—handbooks on operation of lathes, drill presses, shapers — book of projects — wall charts — free-loan, sound, color movies and slides on lathe operation — scale models for shop planning. Samples of printed material free to shop instructors. *Write for them.*

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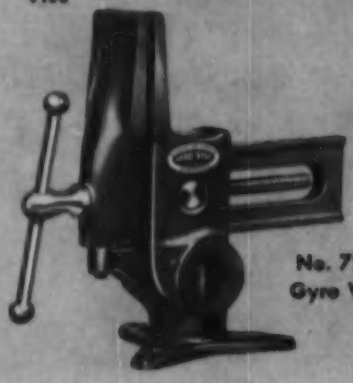

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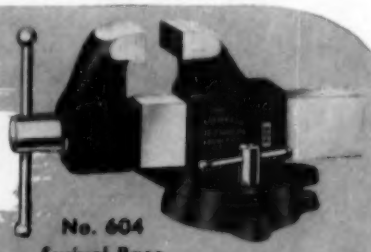

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DECEMBER
1955

VOL. 44 NO. 10

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

Published on the 15th of the month preceding the date of issue by THE BRUCE PUBLISHING CO., 400 North Broadway, Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 225 Broadway, New York 7, N. Y.

★ ★ ★ ★

This Month's Cover

The cover picture shows a group project undertaken by a class in carpentry. The structures are hog houses viewed in different stages of production. The production line moves from right to left and the final process is painting. The woods area is under the supervision of Charles Shoemaker.

Photography by Bernard R. Josif, Ball State Teachers College, Muncie, Ind.

The 1955 Index

This issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is the closing number of Volume 44. If you wish to secure an index for this year, write to our circulation department and a copy of the index will be sent to you gratis as soon as it is off the press.

★ ★ ★ ★

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Association News

COMING CONVENTIONS

Dec. 5–9. American Vocational Association, at Haddon Hall Hotel, Atlantic City, N. J. Secretary, M. D. Mobley, 1010 Vermont Ave., N.W., Washington, D. C.

Dec. 27–30. American Association for Advancement of Science, at Municipal Auditorium, Atlanta, Ga. Secretary, Dr. Dale Wolfle, AAAS, 1515 Massachusetts Ave. N.W., Washington 5, D. C.

NORTH WISCONSIN LAKE SUPERIOR EDUCATION ASSOCIATION

Principal speaker at the industrial arts and agriculture round table of the seventh annual convention of the North Wisconsin Lake Superior Education Association was George Soderberg, associate professor of industrial education and finishing specialist of Stout State college. The convention was held in Superior, Wis.

Taking as his topic, "Finishing Hints," Professor Soderberg addressed a large audience on such factors in finishing as photographic plastic, spot finishing of mars and nicks, finishing of gun stocks, and the proper use of varnishes, flock, and finish removers.

Another Stout alumnus, James Wallesverd, now located in Ashland, was chairman of the sectional gathering to which Soderberg spoke. — *T. F. Fleming.*

ANNUAL STOUT INDUSTRIAL ARTS CONFERENCE

With industrial-arts teachers from several states in attendance, Stout State College held its annual Industrial-Arts Workshop on the campus Friday, October 21. The workshop this year was scheduled as part of Stout's homecoming week end, October 21–23.

Purpose of the gathering was to provide instructors of industrial arts an opportunity to view and perform the latest processes in varied areas of industry. A number of exhibitors displayed new materials and tools of the industrial-arts field.

Demonstrators at the 1955 Stout Industrial-Arts Conference.

Left to right — Ray Kranzusch, Dr. John A. Jarvis, Philip Ruehl, George Soderberg, and Dr. Herbert Anderson.

Under the chairmanship of Dr. Herbert Anderson, head of the woodworking department at Stout State College, programs were planned in five areas of industrial arts. Each group provided demonstrations and encouraged audience participation.

In the field of leatherwork, conference participants heard from Ray Kranzusch, associate professor of industrial education at Stout, and a Mr. Jentzen, representative of the Sax Bros. organization.

Heading the panel on general finishing was George Soderberg, Stout State College faculty member and nationally known author in the field of finishing. Philip Ruehl, head of Stout's offerings in electricity, radio, and television, discussed latest achievements in electronics.

From the school system of Austin, Minn., Lovern Nauss, demonstrated recent developments in metal tooling. Dean of the division of industrial education at Stout State College, Dr. John A. Jarvis, explained new theories in shop management of industrial arts. — *T. F. Fleming.*

WESTERN NEW YORK INDUSTRIAL ARTS CONFERENCE

The annual Industrial Arts Conference was held at the State University, College for Teachers at Buffalo, N. Y., on Friday, October 28, 1955. This conference, organized for industrial-arts teachers, carried the theme "Creative Craftsmanship."

Two outstanding speakers who addressed the group were Glenn A. Wagner, author, lecturer, and craftsman, who delivered an illustrated talk on "Craftsmanship in Action"; and Dr. Walter Dorenburger, Missile Design Consultant, Bell Aircraft Corporation, Niagara

(Continued on page 6A)

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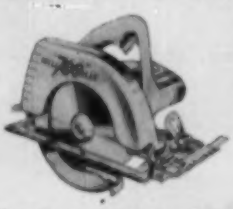

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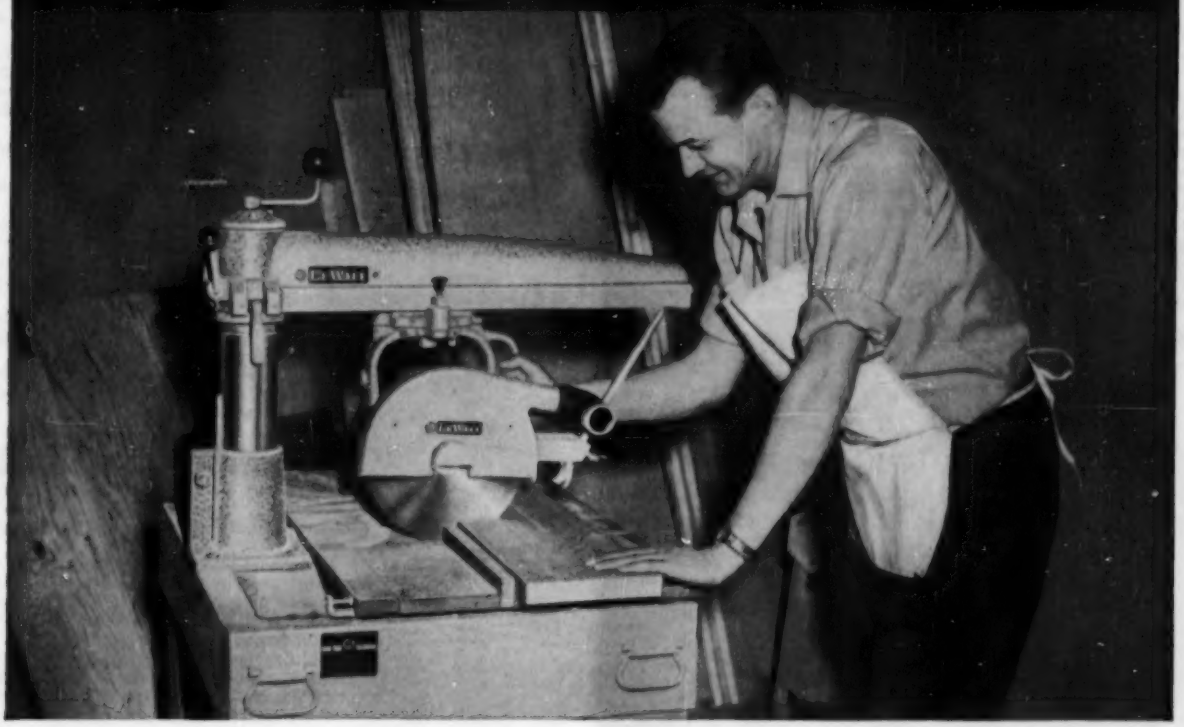

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ASSOCIATION NEWS

(Continued from page 4A)

Falls, N. Y., who talked on "From Guided Missiles to Space Ships."

The afternoon program was devoted to discussions and demonstrations in the areas of ceramics, graphic arts, metals, wood, and school shop planning. Some of those persons who took part in these afternoon discussions were: Fred Finsterbach, Walker-Turner Corporation, Plainville, N. J.; Neil Stillman and Mason Martin, teachers from Amherst Central High School; Benjamin Steinzor, Donald G. Brossman, and John Fontana, professors at the college; students from the College of Ceramics at Alfred, N. Y.; and students from the college at Buffalo, N. Y.

An outstanding exhibit of work from the New York State Craftsman Guild was on display in the Butler Library. Throughout the day all exhibits were open displaying tools, equipment, materials, and supplies relating to industrial arts. — *H. J. Steffen.*

OHIO INDUSTRIAL ARTS ASSOCIATION CONVENTION

The annual meeting of the above named association was held at Columbus, Ohio, on March 17, 18, and 19, 1955.

The over-all theme of the convention was "Improving Industrial Arts in Ohio."

The leader at the opening panel discussion on Thursday afternoon was Dr. William D. Stoner, and the discussion problems for the session were those selected by a group of teacher educators and supervisors.

The panel consisted of two teacher educators, Dr. J. Levan Hill, and Professor Donald E. Perry; two supervisors, D. Arthur Bricker, and Horace M. Jellison; and two teachers, Raymond A. Smith, Dayton, and Carl Bugan, Germantown, Ohio.

J. Herbert Detrick was the chairman of the evening meeting, at which the organization and use of instructional materials in industrial arts was discussed.

The speakers were Elmer C. Baden, Troy; Walter F. Lembright, Dayton; and Russell J. Adams, Hudson, Ohio. Their subjects showed how the general theme was related to welding, woodwork, and the general shop.

The chairman at the Friday morning session was D. Arthur Bricker, and the theme of the meeting was "Project Selection and Development."

The areas covered by the speakers embraced showcard writing and sign painting in the industrial-arts field; and student participation in planning projects for wood, plastics, and metalwork.

The speakers were Arthur Miller, Columbus; Karl F. Huls, Toledo; and Otto F. Furpahs, Parma, Ohio.

P. S. Waldeck presided at the Friday afternoon session at which the theme, "The Industrial Arts Teacher — Present and Future," was discussed.

Richard O. Knight spoke on "Teachers' Self-Improvement," while Frank Moore chose "Teaching as a Profession" as the topic of his address.

The business meeting was held at 3:30 p.m., on Friday.

The annual banquet on Friday evening was presided over by the president of the Ohio Industrial Arts Association, F. Theodore Paige.

Frank Siedal, president of Storycraft, Inc., was the guest speaker.

Saturday morning from 9:30 to 10:30 was given over to demonstrations in silk screen printing, leatherwork, photography, home mechanics, plastic casting, and internal carving of plastics. The demonstrators were: Don Eaton, Wauseon; Tom Rutter, Toledo; Ross W. Stooksberry, Dayton; J. R. Bogan, Ottawa Hills; Gerald Ernst, Archbold; Wallace Barry, Akron.

The "Ship's" program followed the demonstration session. Bruce Bartee was the deck officer, and he was assisted by a number of the 30 exhibitors whose wares had been shown at this convention.

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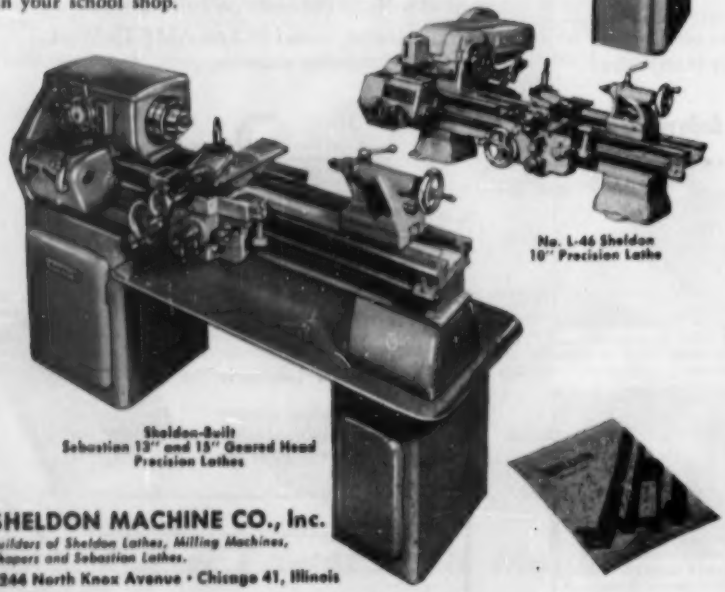
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Personal News

LEWIS WILSON RETIRES

Dr. Lewis A. Wilson, New York State Commissioner of Education since 1941 retired September 1, 1955.

Dr. Lewis received his professional training at Brockport Normal School; Mechanics Institute, Rochester, N. Y.; Stout Institute, Menomonie, Wis.; and Teachers College, Columbia, New York City.

His professional experience was gained by serving as teacher and principal of the Rochester Shop School; director of vocational education, Albany, N. Y.; specialist in industrial education, New York State Department of Education; director state division of vocational and extension education (1918–27); assistant commissioner for vocational and extension education (1927–41); deputy commissioner of education (1941–50); and since 1950, commissioner and president of the University of the State of New York.

He was actively identified with the development of vocational education, adult education, and vocational rehabilitation programs in the state of New York, and also directed many vocational education surveys and studies.

(Continued on page 34A)

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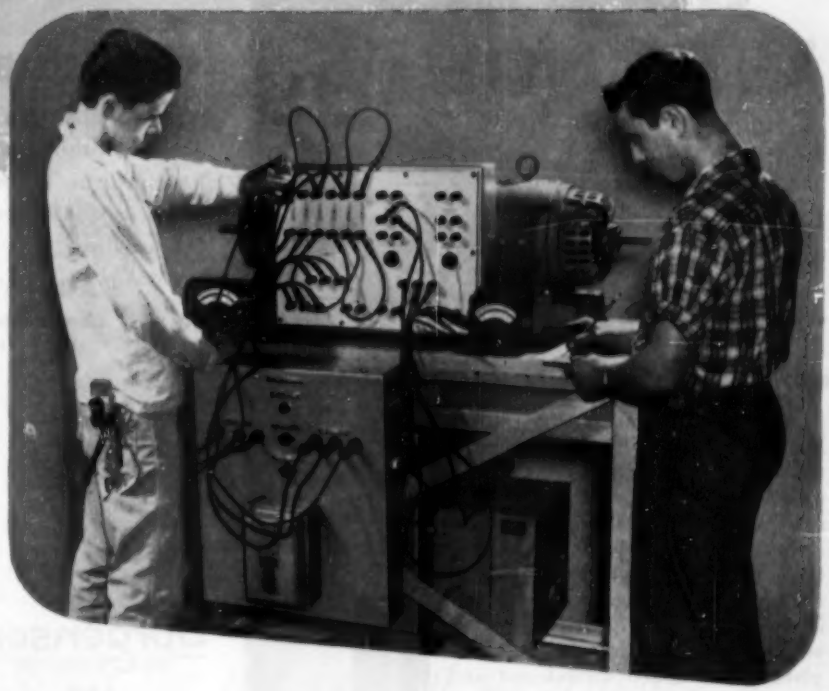

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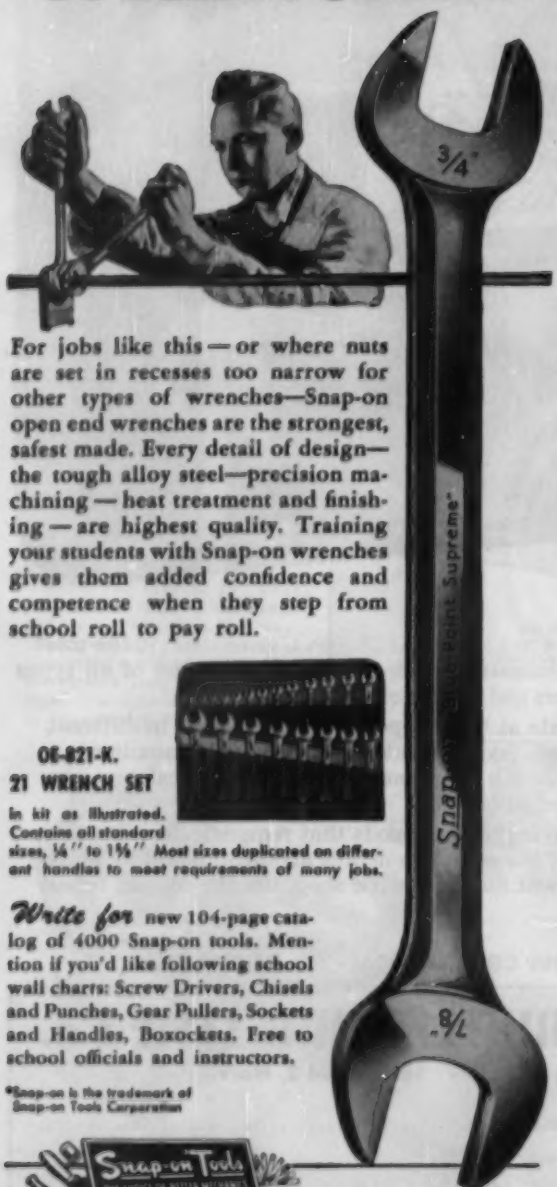

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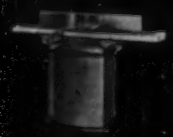
8" Jointer

16" Disk Sander

Belt-Disk Sander

Shaper

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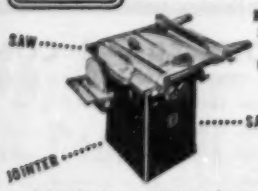

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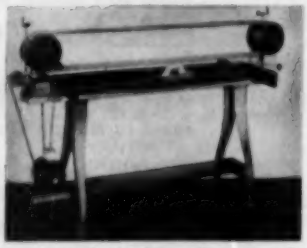

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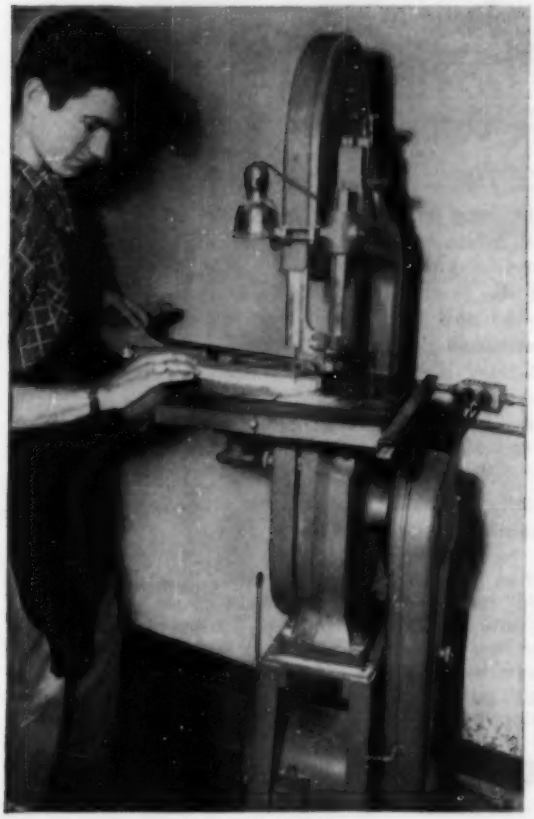

Mr. Schmidt shows student how to feed stock on Delta 6" Jointer.

Student uses Delta 14" Band Saw to cut modern table leg.

Students can safely sharpen tools on completely protected Delta Tool Grinder.

Practically No Maintenance in 15 Years

on DELTA Power Tools at Mayville Central School

Rockwell-built DELTA Power Tools have been in day-in-day-out use for 15 years in the busy shop at Mayville Central School, Mayville, New York. "In all that time, our DELTA Tools have required practically no maintenance," says Mr. Robert P. Schmidt, Industrial Arts Instructor. "When you consider that literally hundreds of students use them, you can picture their ruggedness and year-after-year dependability."

In addition to DELTA'S dependable operation, Mr. Schmidt points out an even more important fact: "DELTA Power Tools are tops in *safety* and *ease of operation*." There are seven "veteran" DELTA Tools in use at Mayville Central: a 24" Scroll Saw; a 10" Tilting Arbor Saw; a 12" Lathe; a 14" Drill Press; a 14" Band Saw; a Tool Grinder; and a 6" Jointer.

When growing attendance at Mayville Central made it necessary to relocate the shop, "We used our DELTA Tools to make cabinets, work surfaces and storage facilities for our new location," reports Mr. Schmidt. "As the school continues to grow and new facilities are built, I'll recommend the purchase of more DELTA Power Tools."

You'll find it wise to recommend DELTA for your school, too. The safety, accuracy, ruggedness and remarkable ease of operation that make DELTA Power Tools the leader in industrial use, also make them the most practical for student instruction. See your DELTA Dealer, or send the coupon for full information.

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The POWERMATIC No. 50 6" JOINTER

Features the longest bed on the competitive market ! !

CHECK THESE OUTSTANDING FEATURES:

- Extra long 48" Bed for precision work.
- Both tables adjustable. Mounted in inclined dovetail ways for easy alignment.
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- All cast iron contruction.
- Totally enclosed heavy steel floor stand.
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This new production type jointer is actually LOADED with features. The extra long 48" bed assures perfect edges no matter how long the board. Knife setting in a Jointer has always been an extremely difficult task, but the Model 50, standard equipped with "jack screws" in the cutterhead, allows quick adjustment in a minimum of time. The rigid center mounted fence prevents uneven edges common on Jointers with end mounted fences.

Manufactured by **POWERMATIC MACHINE COMPANY** McMinnville, Tenn.

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V-2 Series quality workbenches are now in large supply to meet heavy demand at short notice. These 2-student benches cannot be matched in sturdiness and performative styling. V-2, at right, has no tool drawer. V-2D with tool drawer is shown below. Both are 52" long x 36" wide x 32" high. Both have two working sides, each with vise, adjustable bench stop, and removable bench dog. Write for Circular C-532 and price list.

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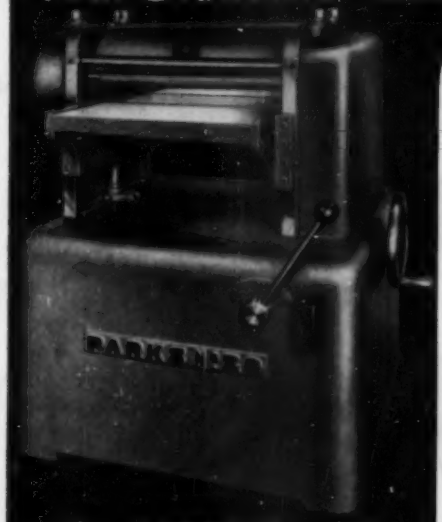

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The Parks No. 20. 20" Planer has a 4-knife cutterhead with a speed of 3600 R. P. M. and offers two feed speeds—20 and 40 F. P. M., and 40 and 80 F. P. M. Will take work up to 20" wide by 6" thick. Ruggedly built for vibrationless operation.

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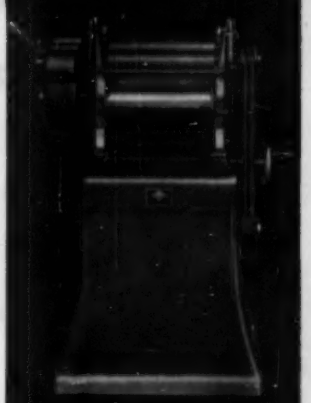

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FOLEY SETTER For both hand and band saws. Sets teeth on both sides in ONE run with perfect machine accuracy.

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You can sharpen 4 to 6 hand saws per hour with these three Foley Automatic power machines — Retoother, Saw Filer, Setter.

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Foley Saw Sharpening Machines have proven their value for making physically handicapped persons self-supporting in their own business. Write us for full details.

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Any Foley machine may be installed on 30 day FREE Trial. Write today for detailed information.

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Files hand, band and cross-cut circular saws with machine accuracy. The saw is clamped in carrier which feeds it through all 3 machines for retoothing, filing, setting.

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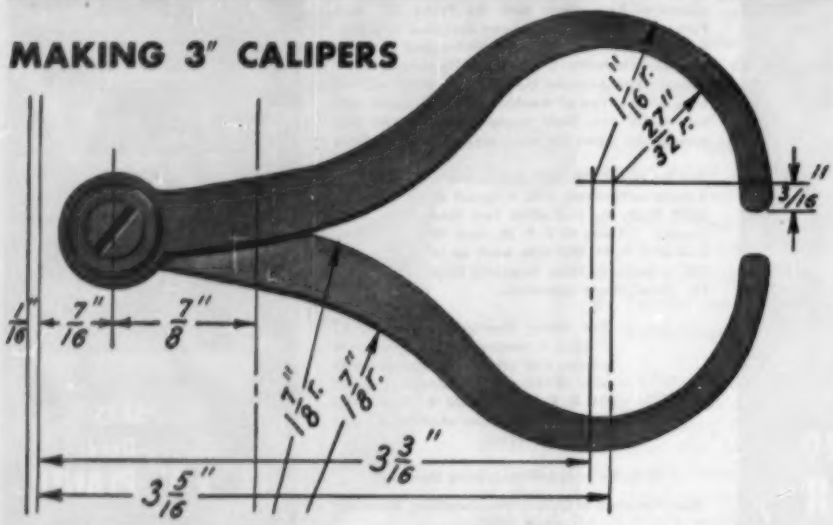
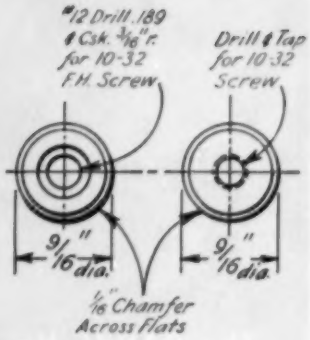
HOW-TO project for the School Shop

—by NICHOLSON FILE COMPANY

NO. 13 OF A SERIES

MAKING 3" CALIPERS



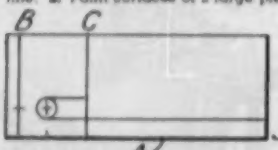


Nicholson is happy to stimulate interest among technical students by this series of shop problems. The response of instructors and school heads in requesting reprints has been most gratifying.

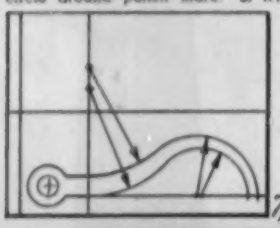
Materials: 2 pieces 1/16" x 1 3/8" x 4 9/16" CRS, 1 10/32" FH machine screw, 2 pieces 1/8" x 3/4" square CRS for joint of calipers, 2 10/32" RH machine screws and nuts. **Tools:** 6" rule, square, scriber, dividers, center punch, hammer, surface gage, hacksaw, #12 (.189") and #21 (.159") drills, 10/32" tap, tap wrench, block of wood approx. 1" x 2" x 5", wire brads, chalk, copper vise jaws, layout dope, Nicholson 8" Mill Bastard, 8" or 10" Half Round Second Cut and 6" Half Round X.F. Swiss Pattern #1 or #2 files.

SCHEDULE OF OPERATIONS

1. File all burs. File edge "A" with Nicholson 8" Mill Bastard. Check with 6" rule for light, even line. **2.** Paint surfaces of 2 large pieces with layout



dope. **3.** With square and scriber, draw reference line "B" about 1/16" from end of stock. **4.** To locate center of joint, set dividers to 7/16". Place leg at intersection of lines "A" and "B". With other leg, scribe small arc on line "A" and another on line "B". Using these new intersected lines as centers, swing 2 more arcs. Lightly center punch at their intersection. **5.** Set dividers to 3/15" and scribe circle around punch mark. **6.** With square and scriber, draw line "C" measuring 1 5/16" from line "B" along edge "A". **7.** With edge "A" on surface plate, set surface gage to 5/8". This should match top of circle. Scribe line parallel to "A" to meet line "C". Set gage to 1/4" and repeat procedure, scribing line length of work. Set dividers to 5/16" and scribe body for joint. **8.** Turn marked piece face down. Place second piece parallel to it and fasten 2 pieces with adhesive tape. Continue line "C" across second piece. **9.** With dividers at 1 7/8" and one leg on intersection of top parallel line and line "C", locate point on "C". Repeat from intersection of bottom parallel line and "C". **10.** Measure 3 3/16" from reference line "D" to a point on 1/4" line and lightly center punch. Set dividers to 1 1/16" and scribe arc to meet first 1 7/8" radius. **11.** Measure 3 5/16" from reference line "B" to a point on 1/4" line and lightly center punch. Set dividers to 27/32" and scribe to meet second 1 7/8" radius. **12.** Clamp pieces together with C-clamp and hold in drill vise. Drill hole at joint with #12 drill. Insert 10/32" screw. Drill another hole in convenient place at other end of work to hold pieces together for sawing. **13.** Saw top section of calipers with contour saw or hacksaw to within 1/32" of line. **14.** Place work in vise with copper jaws and file to line using 8" Mill Bastard. On radius, roll 8" or 10" Half Round Second Cut file, blending straight section to large radius to small radius. **15.** Saw out bottom section of calipers in same manner as top. Place work upright in vise and file 5/8" radii to line. **16.** To make washers, drill #12 hole in 1 piece of 1/8" stock. Use #21 countersink. Check depth with 10/32" screw. Use #21 (.159") drill in second washer and tap with 10/32" tap. Use this as mandrel and turn in chuck to 9/16" dia., chamfering outside edge of each washer 1/16" across flat. **17.** Drawfile flat sides of calipers by holding each leg on block of wood with brads. Use Nicholson 8" Mill Bastard file with chalk for smooth finish. Remove sharp edges with 6" Half Round X.F. Swiss Pattern #1 or #2 Cut file. **18.** Assemble work and check with instructor. Then upset end of screw with hammer to keep washer from backing off. **NOTE:** the instructor may wish the student to make a more elaborate screw as part of this project, instead of the ordinary machine screw used here.



The Nicholson Mill Bastard, Half Round Second Cut and Half Round X.F. Swiss Pattern files are shown here reduced in size from those specified in the text.

FREE REPRINTS OF THIS PAGE

are available to instructors and school heads on request. Please ask for "How-To Project No. 13," stating minimum number of copies you need for school-shop use. *NOTE:* these and other files in the Black Diamond and Nicholson brands are widely available through industrial distributors and better hardware stores.

NICHOLSON FILE COMPANY
Providence 1, Rhode Island
World's largest manufacturer of A FILE FOR EVERY PURPOSE

Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
DECEMBER 1955

TV Helping the Teacher

Industrial Arts on Television in San Diego, California

KENNETH PHILLIPS
Chairman, Industrial-Arts Department
San Diego State College
San Diego, Calif.
and
WILLIAM B. STEINBERG
Supervisor of Industrial Arts
San Diego City Schools
San Diego, Calif.

With the command "dolly up" the program of Your Schools Today opened in San Diego, Calif., on KFMB — Channel 8. This was the first of six television programs planned by the industrial-arts teachers of the San Diego city schools to present some of the activities of the general metalworking area. The local television station had donated time to the city schools for educational purposes. A series of programs had been organized to demonstrate to the public some of the things that were happening in their schools. Industrial arts took the lead and put on six one-half hour weekly performances.

Planning

Two major objectives were decided upon at the outset. First that of beaming the series to the needs of the general metalworking classrooms and second, to explain the total industrial-arts program through short illustrated talks at the beginning of each show. Preliminary discussion made it evident that specific presentations with rather detailed information would be more effective than a broad approach. It was agreed that a general metal project should be completed during the program whenever possible and a display of projects representing the topic of discussion would be made for each telecast. Since all of the programs would be typical shop activities, students throughout the city in the industrial-arts classes would view them on their school television receiver. The program would then be discussed by each teacher and thus the television demonstration would become a part of the regular shop work. It was further agreed that student participation would enhance the interest in the performance and would provide a more typical classroom environment.

To evaluate the series an informal study was to be made by the other teachers to determine the effectiveness of the television demonstration for student understanding. Lay people were also selected to view the industrial-arts program to help improve it and to provide a sampling of public reaction.

The series of programs was then decided upon and were given in the following order.

Bench Metal Work (Hand Tool Demonstration). Teacher: Kenneth Archibald, Lincoln Jr. Sr. High School.

Sheet Metal Work (Soldering and Layout). Teacher: Harmon Kurtz, Pacific Beach Jr. High School.

Foundry (Simple Casting). Teacher: Loyal Roberts, Dana Jr. High School.

Machine Shop Practice (Basic Lathe Operations). Teacher: Carl Cummins, San Diego High School.

Expansion and Characteristics of Metals (Technical Information). Teacher: Ernest Montiel, La Jolla Jr. Sr. High School.

Art Metal Work (Making a Bud Vase). Teacher: Alva Oliphant, Snyder Continuation High School.

The order was determined as a convenience to the teachers preparing for the demonstrations. The programming did, however, mesh fairly well into the student needs for information and new activities.

Organization

The program organization was a group project with all of the participating teachers acting as an advisory committee to review the demonstrations before the program was put on the air. The performing teacher would prepare his demonstration one week in advance so that the television committee could preview the complete performance. This was followed by a critique to improve the program. It was interesting to see the enthusiastic give-and-take of the discussion and note the divergence of opinion regarding the details of teach-

ing techniques. After the rehearsal a continuity sheet was organized, which was used by the station production supervisor in the studio control room. He would give the directions so that the cameraman could *dolly-up* for a close-up or *fade-back* for a wide angle view. The continuity sheet which was used in the machine-shop demonstration appears below.

Machine Shop Demonstration

(*Basic Lathe Operations*)

Introduction — DeGraff Stanley, Television Teacher Consultant
William B. Steinberg, City Supervisor of Industrial Arts

Demonstrating Teacher — Carl Cummins, San Diego High School

Video	*Audio*
1. Identification Card, Credit Card, and Reporter Cards.	1. Theme song, Mr. Stanley introduces program with standard opening.
2. Mr. Stanley and Mr. Steinberg MCU (Medium Close-Up)	2. Mr. Stanley introduces Mr. Steinberg to audience.
3. Mr. Steinberg and Charts on *a*) The industrial-arts program *b*) General metalworking activities CU (Close-Up) of Charts when pointing.	3. Talks about and points to Chart A and then Chart B. Introduces Mr. Cummins and turns program over to him.
4. Mr. Cummins and Students — MCU	4. Students introduced.
5. MCU lathe shown as well as two types of projects. CU combination lock becomes demonstration project to illustrate turning, facing, boring, and turning between centers.	5. Teacher explains parts of the lathe, its importance in industry, and its place in the school shop.
6. Bulletin board, CU to show exploded view of lock and chart of materials and processes.	6. Sketch talked about and explained. Run down of materials, tools, etc.
7. To display bench. CU of model and also actual lock.	7. Explanation of parts and their function.
8. To lathe. Set up for first operation. Turn, face, and bore cylinder.	8. Clamping action of chuck, type of tool bit, and position of tool holder.
9. To display bench. Show finished cylinder on model.	9. Explanation of drilling, sawing, and filing operation.
10. To lathe. Set up disks for turning on a mandrel.	10. Center drilling, use of tailstock center, and type of tool used for aluminum.
11. Still at lathe. Show change of chuck and method of relief cutting.	11. Cut in automatic feed. Use of cross-feed for a facing cut.
12. To display table. Show finished disk.	12. Explain filing of slot for locking pins.
13. To lathe. Show turning of shaft for staple.	13. Explain filing in lathe and use of abrasive cloth for finish.
14. To display table for assembly of entire lock.	14. Explain lock mechanism and setting of combination.
15. MCU Mr. Stanley, Mr. Steinberg, Mr. Cummins, and students.	15. Steinberg and Cummins review and summarize with questions and discussion.
16. Final Credit Card and Closing Card.	16. Stanley closes and signs off.

One half hour before going on the air the program director would have a short rehearsal of the major activities. Since he was an extremely skilled person in program production he could very easily follow the performance with the sketchy outline shown above.

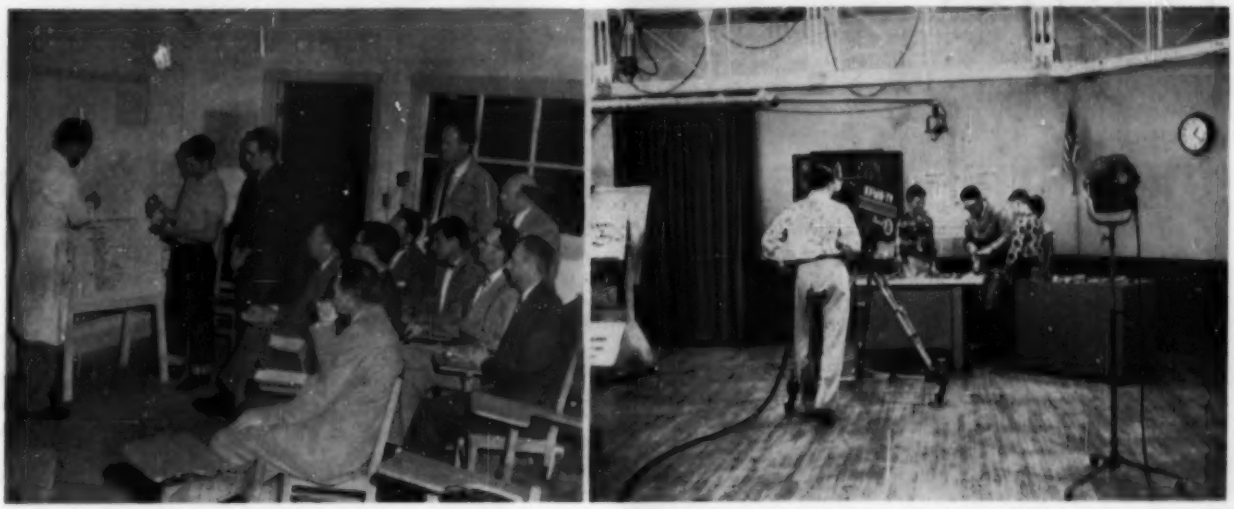
Production Problems

Each performance pointed up interesting problems of production. The most important thing learned was that one may talk at a normal rate of speed, but must slow his motions down to what seems to be *slow motion*. This is particularly important in moving from one position to another. In showing articles to the audience one must not only move slowly, but turn the article so that time is provided to gain full attention. This also makes it possible to see the details of the article. Moving from bench level to eye level must be done very slowly since it is not advisable to move the camera rapidly up and down. Perhaps the most amusing problem encountered was that of the participation of students in the programs and their apparent interest in seeing themselves in the monitor set. They invariably would be awe-struck by their own image. Their attention would be diverted from listening to the material presented to looking at the monitor. The monitor set should be placed where it cannot be seen by the students even though the professionals use it to watch themselves and alter their positioning or stance as is necessary. Student participation, it was discovered, does increase the interest level and should be used as much as possible.

Unique practical problems developed out of the type of activity which was being demonstrated. Each program of the six raised a particular problem that had to be solved. Bench-metal work required many small hand tools and objects, making it most essential to have a master check list which was checked by the teacher involved as well as by two other people. Sheet-metal work dealing with soldering and layout made it necessary to devise a soldering copper furnace using an acetylene torch and fire brick. Gas was not available in the studio. The pouring of molten metal in the foundry demonstration presented a problem. The complete process of ramming a mold and pouring the metal which would result in a finished casting was desirable. It was, therefore, necessary to select a metal that would melt at a low temperature and cool very rapidly. Lead was selected as it was found that it could be melted in a simple kitchen pan placed on an electric hotplate and would cool in time to remove the casting from the sand. The expansion of metals was demonstrated by heating the various metals with a torch and having the rate of expansion visually recorded by a large hand on a dial. The torch had to be silent so that the explanation could be heard over the microphone. It also had to be shielded so that it would not glare in the picture. The buffer in the art metal program was not bolted to the bench. During the demonstration the student started buffing the project and had to hold the buffer down with one hand while he held his project in the other hand. This problem was not anticipated since during the rehearsal the regular shop buffer was bolted to the bench.

Obtaining various types of equipment for the telecasts was always of concern to the teachers. Each demonstration required the movement of considerable equipment. As an example, the lathe used for the machine-shop program was furnished by one of the local machinery sales firms because of transportation difficulties and the type of current available in the studio. Other problems of a similar nature were encountered; however, none of them were found to be insurmountable.

The San Diego city schools have decided their series of programs about education were most successful. The industrial-arts teachers of the city felt that the six demonstrations offered an opportunity for them to tell about their

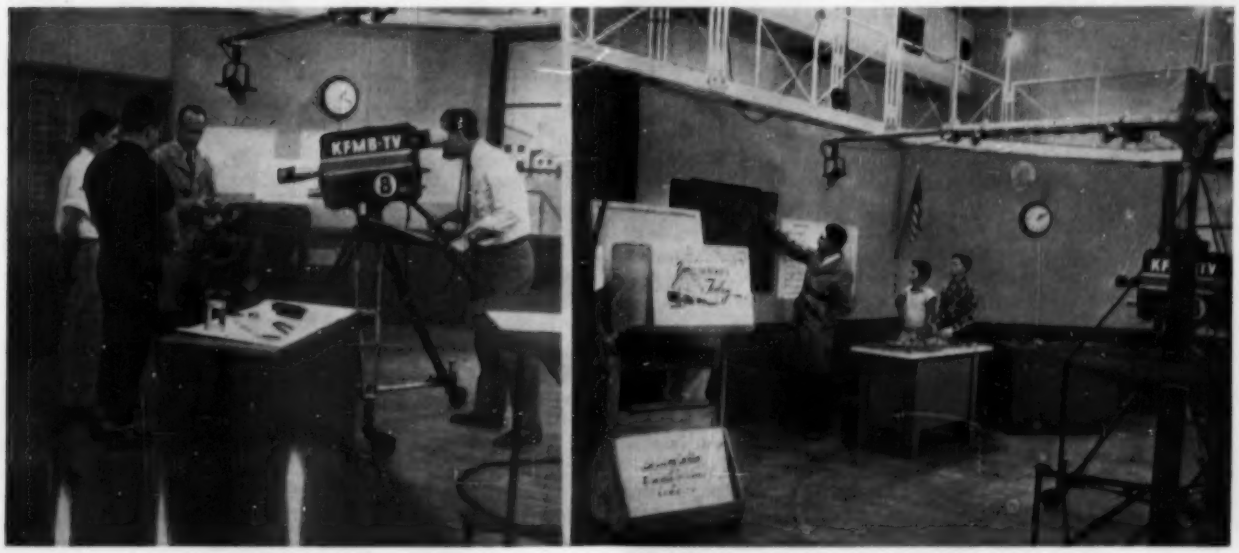


Advisory committee meeting, and rehearsal for the machine-shop television show

program in a most interesting manner. The visual presentation of activities of the type that are carried on in the school was enthusiastically received by the public. Industrial-arts activities lend themselves admirably to television and the profession has an advantage in getting its message to the public. In addition to the public relations values there are many opportunities for in-service training. The six teachers who worked so closely together became better acquainted which gave them an opportunity to share experiences. This group has continued to meet at regular intervals and have invited other teachers to meet with them for the improvement of their instructional program. A new awareness of teaching techniques also grew out of the process. Teaching demonstrations were improved considerably since the demonstrator was very meticulous in his preparation and the teacher viewing the show had an opportunity to analyze the technique used. It provided a stimulus to and recognition of master teachers in the field of general metalworking. Other values could also be mentioned. Students in many cases said, "My teacher can give as good a demonstration as that any day." Others said, "Gosh, that certainly was swell," and when their teacher reviewed the same material in the shop they discovered that a good level of understanding had been attained. It might be said that the industrial-arts teachers of San Diego are looking forward to another opportunity to put industrial arts on television.

CAT CRACKER'S DISH: CHINA CLAY

China clay, used for centuries in the manufacture of fine chinaware, is now being put to work as a low-cost catalyst in petroleum refineries. Catalysts are materials that speed up chemical reactions without themselves being changed in any way. The new mineral catalyst, whose chemical name is kaolin, will help supply the increasing demand for these agents, which is expected to double in the next five years as more and more "cat" crackers are put into operation. Cheaper catalysts for our oil refineries will eventually mean more abundant living for millions of people. — *Petroleum Newsnotes.*



Machine-shop demonstration on television. At right, using the chalkboard during the television sketch

A Worth-While Direction Pointer for the Industrial-Arts Teacher

Industrial Arts Teacher Competencies

HARRY A. PEDERSON
Director, Industrial Arts Division
State College
Platteville, Wis.

In the long run one of the most effective ways of improving the teaching profession is to get a greater number of highly competent and well-trained people in the profession. This holds true in industrial arts as well as in other fields.

The competencies enumerated in this article are essential for a beginning teacher. Naturally, these competencies will be strengthened if graduate work is taken and when experience is gained. Important as graduate work is, it must be remembered that most of our men teach some years before receiving the second degree. Moreover, graduate work to be really sound has to have a firm foundation. The job of preparing first degree men is admittedly difficult, but we must educate them as well as possible if industrial arts is to progress. It should be the business of all teacher training institutions to see to it that their graduates have the necessary competencies.

A competency is defined as a sufficient amount of anything. To get wide and perfect agreement on what is sufficient would be difficult and perhaps unnecessary. However, it should be possible for a staff to determine whether their graduates have the following suggested competencies.

1. *Knowledge of subject matter.* This is still one of the most important abilities. A beginning teacher should be as highly skilled in at least two areas as it is possible to make him. Skill in the sense meant here includes high ability to perform, as well as wide technical and general information in two areas. In addition to this, the graduate should have considerable skill in at least one other area and some basic knowledge in still other areas. High ability to *do* will gain us greater and greater respect and esteem. Above all let us avoid graduating men with only thin, superficial knowledge in many areas.

2. *Ability to select and organize subject matter for a particular situation.* Somewhere along the way the student should write out a complete course of study for a typical and realistic situation given him by his instructor. If a graduate is competent to do this, industrial-arts teaching will continue to improve.

3. *Ability to teach.* Good teaching is a composite and complex ability. None the less, it is believed that those responsible for preparing our teachers should assure themselves that the graduate can:

a) Give forceful demonstrations.
b) Conduct discussions.
c) Give well-organized lectures.
d) Motivate students to learn what should be learned.
e) Conduct application periods properly.
f) Relate shop work to other subjects.
g) Measure achievement and behavior.
h) Stimulate critical thinking.
i) Inspire students to do their best.

4. *Ability to plan new shops and remodel old ones.* These days many new industrial-arts departments are being started and existing ones are being expanded. Therefore, it is essential that teachers be familiar with the fundamentals of school shop planning. They should have experience in planning and completely outfitting a typical shop. Graduates with this ability and experience will cause great improvement to be made in existing shops and in the quality of new shops.

5. *Ability to manage shops.* What is meant here is the ability to manage the physical and human aspects of a shop. It is granted that the teacher trainers may find it difficult to give adequate experience in this activity. Yet it is important to order and manage supplies, keep equipment in good shape, and set up and manage sensible pupil personnel systems. Indeed it may be stated that a shop teacher's success depends, to a great degree, on competence in this area.

6. *Ability to promote industrial arts.* Every teacher should be able to sell education and most certainly should be well versed in the techniques for promoting his own specialty. Enemies of public education exist in our country, but their efforts can be offset by public relations minded teachers.

7. *Ability to do independent work in writing.* Some will state that all graduates cannot be expected to do writing. Why not?, are they not college graduates? Teacher educators should encourage students to write for the college paper and for our professional magazines. Many students create new designs and projects. They should write these up and seek publication. If this cannot be done by all, the teacher educators should provide opportunity for prospective teachers to write expositions on various phases of industrial arts.

8. *Knowledge of professional literature.* It is possible, for a man to be a fairly good shop teacher with little knowledge of professional literature; however, extensive knowledge in this field is an essential competence. Strength here will increase his stature with his colleagues, make him a better teacher and tend to keep him up-to-date.

9. *Knowledge of "literature" from business and industry.* There is such an abundance of good material of this kind that every teacher should know:

a) Where to obtain it.
b) How to obtain it.
c) How to evaluate it.
d) How to organize it and file it for easy use.
e) How to use it properly in class instruction.

10. *Knowledge about leaders.* A phase of being professional is a knowledge of the great leaders of the past and present. We have had and now have leaders in our field of whom we can be immensely proud. Prospective teachers should know about these men, their struggles, ideas and contributions. Familiarity with the writings of our leaders before graduation will more likely result in continued reading afterward.

11. *Knowledge of the history and philosophy of industrial education.* It is considered desirable that college graduates have a sound background in American his-

tory. It would seem that a knowledge of the major features of industrial-education history also should be one of the tools in a competent industrial teacher's kit.

12. *Understanding of the place of industrial arts in elementary education.* A relatively small percentage of industrial-arts graduates actually teach in the lower and intermediate grades. However, they should understand the purposes of craft work in these grades. They should be equipped to advise the classroom teacher on equipment, materials, tools, and processes. In some cases industrial-arts teachers may give craft training to elementary teachers and on occasion actually do some teaching to the small chlidren.

13. *Understand the characteristics of children of different age levels and feasible curriculum patterns for each grade.* It is likely that most industrial-arts graduates have had a course or two in psychology. Nevertheless, the industrial-arts teacher educators should satisfy themselves that their trainees have an adequate understanding of the real characteristics of junior and senior high school students. A thorough knowledge of what courses may be offered in grades 7 through 12 and possible sequences, will do much toward improving the offerings in our public schools and will give our men greater confidence in working with administrators and colleagues on curriculum matters.

14. *Understanding of the name, purpose, and make-up of the professional organizations in our field.* The time to intensify the professionally minded spirit is during the junior and senior years in college. Students should be urged to take out student memberships in their state and national industrial-arts organizations. The staff should assure themselves that their graduates have a thorough knowledge of local, state, regional and national organizations. Furthermore, the staff should strive to implant in their graduates the desire to join their professional organizations and to accept responsibilities therein. We can't afford to have free riders.

15. *Ability in English and Speech.* The case for writing has already been made. The employment of good speaking techniques also is a vital factor in teaching success itself. In addition our men should have the competence to speak before various groups with clarity and force. A teacher who speaks in a stumbling halting manner before a group is not likely to have his views well received. Another competence in line with the above is the ability to organize and conduct meetings using proper parliamentary procedures.

16. *Understanding of how to create and maintain a safe shop.* Competence in this area is something a teacher must have the very first day he begins to teach. Safety instruction must not be left to chance, but must be an integral part of every shop and methods course. Teacher educators must satisfy themselves beyond any doubt of the students' understanding of shop safety.

Summary. Graduate work and experience will strengthen the competencies discussed in this article and develop additional ones. Notwithstanding this fact the writer takes the view that the capabilities listed should be possessed by the first degree graduate. He is to make an impact on a school and community immediately and consequently should be as competent as possible to the end that industrial arts and the profession of teaching be advanced.

Delegates and guests at the Minnesota Industrial Arts Association Executive Council meeting held May 7, 1955 at the State Teachers College, Saint Cloud, Minnesota

Reading from L, front row:
1. Clifford Horn, Saint Louis Park High School
2. Charles Cummer, Kimball High School
3. Harry Jackson, Winona Teacher College
4. Malcolm Deane, Central Junior High School, Saint Cloud (Vice-president MIAA)
5. Frederic Rowell, Richfield High School (Secy-Treas. MIAA)
6. Robert M. Worthington, U. of Minnesota (President, MIAA)
7. Raymond King, Roseville Public Schools
8. Raymond Deane, Central High School, Saint Paul

Row 2 (middle row):
1. Dale Davidson, Central High School, Minneapolis
2. Walter Rempel, Springfield High School
3. William J. Micheels, University of Minnesota
4. Alvin Flint, Pipestone Public Schools
5. Milo McCoy, Jackson Public Schools
6. Maurice J. Nelson, Mankato State Teachers College
7. Kenneth Fechter, Roseville Public Schools
8. Hugh Fairbairn, Cloquet High School
9. Raymond Hughes, Roseville Public Schools

Row 3 (Back row):
1. Perry G. Rowland, Saint Cloud State Teachers College
2. Curtis Johnson, Clarkfield High School
3. L. N. Westenberg, Plainview Public Schools
4. Wallace Karjalahti, Student, Saint Cloud Teachers College
5. Floyd Wurscher, Gaylord Public Schools
6. Walter Klausler, Minnesota State Department of Education
7. C. T. Larson, Breckenridge Public Schools
8. William Kieffer, Breckenridge Public Schools
9. Herbert Peterson, Cloquet Public Schools
10. Karl Ruthenbeck, Virginia Public Schools
11. Richard Haskell, Student, Saint Cloud Teachers College

Note: Name of towns in Minnesota are same as school unless otherwise indicated.

This Author Has Accomplished Much With

Photography in the Graphic-Arts Laboratory

HARRY A. GOLDSTEIN
Instructor of Photography
Graphic Arts Department
High School
Tucson, Ariz.

This is a basic course of study in photography for use in schools. This course was prepared by a teacher to aid other teachers.

Photography is an important part of graphic arts. It is a tool of the business world, the number one hobby of the nation, and a vocation that has unlimited possibilities. Thus, photography in graphic-arts laboratory has both vocational and avocational values.

This course of study was prepared by a teacher of 32 years of photographic experience, 14 of which were spent teaching photography in the graphic-arts department at the Tucson, Ariz., high school. In addition, he taught adult evening school classes for eight years.

This course of study is flexible and comprehensive to fit situations that are common to both academic and vocational types of schools. It will enable both the student and the teacher to achieve their goals successfully.

In order to meet the special needs of every student, a vast amount of practical and theoretical experiences must be encountered. It is natural that in any class some students will find some special interest or problem. The course described contains much extra material. These experiments will enable the more ambitious students to do extra work.

During the student's first year in the graphic-arts laboratory it is recommended that approximately 60 hours be devoted to photography. During this time we have found that the average student can successfully complete the first group of seven experiments.

When the student returns to the graphic-arts laboratory for his second year, he will begin his studies with experiment eight.

In our school we do all the photographic work of our school publications. We do everything, except the small student portraits. These are done in a local photo studio. Whenever possible we tie in our lectures and demonstrations with publication activities. A lecture and demonstration will precede the taking of photos of any activity whether it is sports or dramatic arts. Hence, everything the student learns is put into immediate use.

Rules and Regulations

Our aim is to develop an individual versed in the basic fundamentals of the art and science of photography.

In the laboratory, it is essential to develop in each individual respect for his fellow man in order that he can live harmoniously with himself and his fellow beings. He must develop integrity, initiative, and character.

In the light of these aims, established rules and regulations of the lab are in actuality, *Standards of Accomplishments*. As such, progress will be measured by the degree to which one attains these common ends.

Graphic-Arts, One Year Photographic Laboratory Course — 60 Hours

Objectives of Instructional Units — Photography I

1. To determine the student's skill and judgment in criticizing photographs as to interest, composition, and tone quality.

2. To become acquainted with photographic paper, its uses, how it is used, and how to obtain good prints.

3. To acquaint the student with developing photographic pictures. Here the student really begins to learn the foundation of photography. The latent image and the effect of each chemical upon that image. The importance of proper exposure and the correct grades of paper for the different contrasts of negatives.

4. To acquaint the student with simple camera techniques, proper exposure, composition, and roll film developing.

5. To learn how to make an enlargement, how to manipulate the enlarger and use the proper techniques in producing an enlargement.

6. To learn how to tint a photograph. To produce a picture in color using photo oil tints.

7. To make a simple photo Christmas card, using a mask and a photo taken by the student.

Photography II — 60 Hours

8. To learn how to mix the various solutions used in photography.

9. To learn the parts of the more advanced camera, how these parts function, and their relationship to each other. Plus, how to properly use exposure guides and the exposure meter.

10. To learn how to take a simple photograph using light from one source. This may be done with a single photo flood light or sunlight.

11. To learn how to use depth of field effectively in taking a photograph, and how to figure depth of field.

12. To study the effect of different filters on various colors using daylight as a source of light and panchromatic film.

13. To make a landscape picture using a filter to darken the sky.

14. To make a simple portrait using triangle lighting.

15. To make a photo Christmas card.

16. To use artificial lighting in producing pictures that are interesting and forceful.

17. To make a still-life picture using inanimate materials showing texture, composition, and light and shadow.

18. To acquaint the photographer with the technique of combining parts of two negatives to produce a single print called a montage.

19. To make a copy of a map or chart using panchromatic film and proper filter.

20. To make a portrait using sunlight and a reflector.
21. To learn how to reduce negatives that are overdeveloped or overexposed.
22. To learn how to intensify negatives that are underexposed or underdeveloped.
23. To make an action photograph using the proper exposure and development for best results.
24. To make a picture involving the problems of close-up photography.
25. To learn the techniques of fine grain developing.
26. To learn how to use high speed film and take pictures under weak light conditions.
27. To learn simple retouching techniques using new coccine red dye on the negatives.
28. To learn how to opaque part of a negative.
29. To learn how to tone a print.
30. To learn how to solve simple optical problems involving the major and minor conjugates.
31. To learn how to use supplementary minus and plus lenses.
32. To learn how to develop color film using the Ektarchrome process.

BASIC EQUIPMENT NEEDED

2 Speed Graphics complete with flash, rangefinder and 12 cut film holders, and vulcanoid case
2 Series 6 lenshade and adapter ring
3 Series 6 filters, A, K2, and G
1 Weston exposure meter and case
24 Film clips
24 Cut film developing hangers
4 Safelights-Kodak Utility Safelight lamp Model C
2 Kodak darkroom lamp with green safelight
1 Sr. Quickset Tripod
6 Stainless steel print tongs
4 Victor extension lights
2 Airequipt easels
1 Paper trimmer
1000 Negative envelopes 4⅛ by 6½ in.
1 Print washer
2 5 by 7 contact printer
1 Print drier 19 by 25
4 Ferrotype tins
2 Solar enlargers model 45D with F:4 Ross lens
Storage tanks
Developer (10 gal.)
Hypo (10 gal.)
2 Stands for above tanks
1 Film developing tank
Extra insert tank
Light cover
1 Developer tray 12½ by 16 by 2 in.
2 Hypo trays 18 by 22 by 6 in.
1 Stainless steel bucket
1 Stainless steel graduate Graphic-Arts Shop Book List in Photography
6 Copies, "How to Make Good Pictures" from Eastman Kodak Company

LIST OF PHOTOGRAPHY MAGAZINES

1. Modern Photography, 33 West 60th St., New York City 23, N. Y. Miss Jacquelyn Judge, Editor.
2. Photography, 366 Madison Ave., New York 17, N. Y. Bruce Downes, Editor.
3. Photo Dealer, 33 West 60th St., New York 23, N. Y.
4. U. S. Camera, 420 Lexington Ave., New York 17, N. Y.
5. Industrial Arts and Vocational Education, 400 No. Broadway, Milwaukee, 1, Wis. J. J. Metz, Editor.
6. The Photographic Society of America, 28 Leonard St., Stamford, Conn. Don Bennett, Editor.
7. School Shop, 330 Thompson St., Ann Arbor, Mich. Lawrence W. Praaken, Editor.

A Discussion as to How —

Visual Aids as the Teacher Educator Sees Them

MERRITT W. HAYNES
State Teacher Trainer for Trade and Industrial Education
Mercer University
Macon, Ga.

One function of the vocational teacher trainer is to help his teachers-in-training to evaluate and use effectively the various available instruction methods and devices, to the end that their trainees may acquire the skills and information necessary for successful employment.

The vocational teacher will consider his stock of instruction methods and devices in much the same attitude as the mechanic regards his tool board. For a job in hand, this mechanic selects and takes from the tool board the tools which will give best results in doing the job. Likewise, the teacher, in planning any lesson, will select and use the instruction methods and devices by which the lesson in hand can be most effectively mastered.

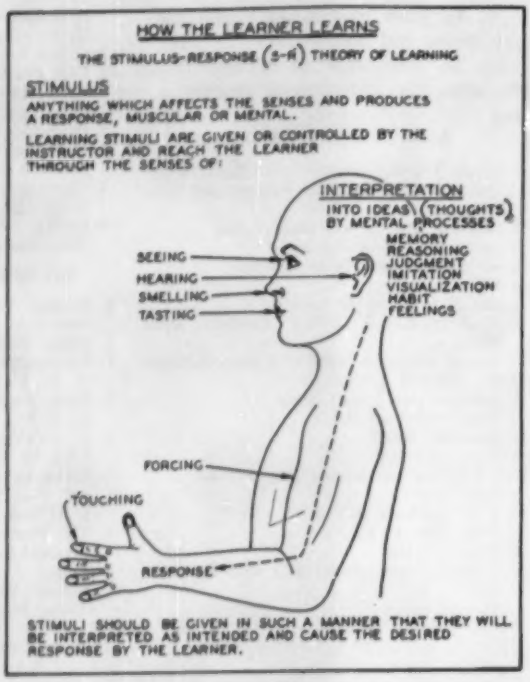
Among the instruction tools available are the *methods* of lecture or telling, demonstration, illustration, questioning, study, manipulative practice, experiment, and others that may be classed as methods because they are orderly types or patterns of procedure in instruction. Supplementing the methods of instruction are various contrivances, inventions, or appliances which are *devices* of instruction. By this classification we find that the illustration method, the essence of which is *exhibiting* something, employs the type of devices called visual aids. The teacher trainer wishes to help his teachers-in-training to see how this type of instruction device functions in learning, and to compare its efficiency with that of other devices or other methods.

Any instruction method or device should be appraised on the basis of its effect in learning by the student. This appraisal would be based upon the degree to which each member, unit, or phase of the human learning mechanism functions in learning a given lesson when stimulated by the various instructional methods, in order to determine which method will yield the most satisfactory learning accomplishment.

A report on such an appraisal, scientifically conducted, would be in order here. Unfortunately, no such report has been discovered by this writer. A

study of this subject would be a suitable assignment for research which could yield some helpful theses for graduate degrees. We can, however, give some attention to the manner in which visual aids function in the normal learning process. To this end, let us review the familiar *Stimulus-Response* theory of learning.

The substance of the stimulus-response theory is that learning stimuli are given or controlled by the instructor; that they are received by the learner largely through six of the receptor senses, namely, seeing (visual sense), hearing (auditory sense), smelling (olfactory sense), tasting (gustatory sense), touching (tactile sense), and forcing (muscular or kinesthetic sense). The sense impressions are interpreted into meaning or ideas by mental processes, the important ones for our purpose being memory, reasoning, judgment, imitation, habit, visualization, and feelings or motivation; and finally, this interpretation results in a *new* response by the learner, this response constituting learning.



Stimulus — response theory of learning

This discussion might well be extended to include the functioning of all the receptor senses; but since it is claimed by psychologists that 85 per cent of all learning results from stimuli received through the visual sense, we will confine our thinking to this area, with the assumption that the principles herein expressed may apply with equal force to all the other senses.

Visual aids, then, are instruction *devices* that present learning stimuli through the sense of sight. The wide variety of visual aids, how they are produced and administered, is familiar to educators, for these devices have been used since the time of Commenius and Pestalozzi. It is profitable, however, to consider how this use affects the functioning of the mental processes in producing the desired learning responses, to the end that the teachers may control the stimuli most efficiently, and may recognize any limitations that may exist in the use of these aids. Let us then try to see how visual aids may facilitate the functioning of the mental processes.

1. *Memory.* If an idea is not retained so that it can be recognized and recalled at will, the learner has not learned it. How can the use of visual aids contribute to memorizing? One of the most potent factors in effecting memorizing is vividness. No instruction device can surpass visual aids in presenting a subject with vividness which gives an enduring impression.

2. *Reasoning.* The learner can better master the *how* of a situation if he understands the *why*. Charts, graphs, projected views, and the like can show cause and effect, sequence of process, assemblies and details, and many other features whereby the learner can comprehend and form conclusions more readily and clearly than he can through any other means.

3. *Judgment.* For our purpose we define this term as making decisions for action, involving the factor of volition or will to do, which is not comprehended by reasoning alone. By dramatizing the consequences of good judgment contrasted with bad judgment, the observer will be more likely to choose and do the right thing in similar situations. Such dramatizing is readily accomplished by visual aids.

4. *Imitation.* One of the major purposes of the demonstration in a performance lesson is to give the learner a model of action to imitate. This model should represent the best skilled performance of the instructor. Visual aids, and particularly the motion picture, can show masterful performance by other skilled craftsmen than the instructor — in fact, in some cases, such a picture can be a substitute for the instructor's demonstration.

5. *Habit.* The first law of habit forming, *right start*, is fulfilled by imitation of correct action. The vividness of the visual aid in showing the correct way to do anything, facilitates the learner's effort to do it right the first time; but it is the responsibility of the teacher to see that the learner does it right every time until the desired habit is firmly established. Seeing that the action is done right every time is a phase of teaching in which the instructor cannot depend on the motion picture to do his work for him. The visual aid is not a supervisory device.

6. *Visualization.* The learner is helped to form mental pictures of hidden or intricate processes by means of such devices as diagrams, graphs, flow charts, cut away models, mock-ups, sectional and exploded views, which accomplish what no amount of lecture alone could do. This use of visual aids is too obvious and well known to need further comment here.

7. *Feeling or motivation.* Dramatizing, either by persons or through pictures, can contribute much to getting the learner to see the advantage to him of acquiring the skill or knowledge included in the assigned lesson, so that he engages in his learning efforts with an effective mind-set.

Now let us see how visual aids fit into the normal pattern of a lesson. Our revision of the Allen version of the Herbartian formal steps of instruction is expressed in five stages; namely, getting ready, motivation, presentation, application, and testing. How do visual aids function in each of these stages?

Getting ready. The stage of instructor activity prior to meeting his learners includes making the teaching plan, securing necessary equipment, providing the materials needed for the number of learners in the group, and preparing teaching aids. The visual aids to be used will be chosen in connection with planning the instruction. The teacher makes this choice by determining whether the use of the visual aids will secure better learning than can result from other instructional methods. If visual aids are to be used, they should be adequately prepared. Unfamiliar films should be previewed in order to discover important features to be pointed out to the class for special attention when they see the film and for discussion afterwards.

Motivation. In the contact of the teacher with his class, his first stage of activity is getting the learners in a favorable attitude and understanding to receive the lesson. Suitable methods for this stage are development questions, review of previous learning, citing cases or experiences, and showing exhibits or dramatization to explain the need for the new lesson and develop a desire to learn it. In this stage, the use of visual aids may function very effectively.

Presentation. With the learners prepared to receive the lesson, the teacher may proceed with the presentation of the new subject matter. Suitable activities for this stage include explanation and demonstration, supplemented by exhibits to explain new facts, principles, processes, manipulations, constructions, etc. These exhibits represent a large use of visual aids.

Application. However skillfully done, presentation alone does not insure learning. This must be fixed in the memory or habit by suitable learner activity prescribed and supervised by the teacher. Forms of activities suitable for this purpose are manipulative practice, experiment, study, writing notes and reports, solving problems, and making sketches. In this stage of the lesson, learner activity does not utilize visual aids. When charts, graphs, or diagrams are consulted in connection with the learner activity, such reference is actually an overlapping of the presentation stage into the application stage of the lesson. During the application stage, the teacher's activity is largely supervisory, and, as we have already noted, the visual aid is not a supervisory device.

Testing. It is the responsibility of the teacher to verify the adequacy of the learning. This is accomplished by inspecting finished work, checking written work (including notebook work) and answers to test questions or examinations, and, finally, recording the scores of such testing. These activities are not facilitated by using visual aids. The progress chart is rightly classed by Weaver and Bollinger, in their excellent book on this subject, as a visual aid, but its actual functioning in instruction is in motivating the student for further learning, which places it in the motivation stage of subsequent lessons.

This brief analysis to discover how visual aids fit into the total pattern of instruction gives us some important conclusions.

1. The advent of visual aids does not upset in any way our basic principles of learning and teaching. Learning is still done by means of the learning mechanism with which all normal persons are equipped, and our concept of formal stages in instruction remains unchanged.

2. Visual aids function principally in the motivation and presentation stages of the lesson, and in these stages such aids can be of large service in supplementing the activity of the teacher and clarifying his presentation.

3. The fact that in the application and testing stages visual aids function slightly if at all, imposes upon the teacher particular diligence to make sure that use of these aids in the preceding stages may yield maximum learning value. His work is not lessened by using visual aids, but it is made vastly more effective if he knows how to use them to aid, not to substitute for, his activity.

4. The afore-mentioned conclusion implies the duty of the teacher trainer to give special stress, coaching, and drill to his teachers-in-training relative to their conduct of the application and testing stages of their instruction where visual aids have been used in the earlier stages.

A GIANT FORGING PRESS

A giant forging press weighing almost 4,000,000 lb., and capable of applying 8000 tons pressure, has begun operation at Aluminum Company of America's Cleveland, Ohio, works.

The 8000-ton press, which was supplied to Alcoa under a lease arrangement with the U. S. Air Force, is an important production tool for vital aircraft forgings.

It fills an important gap in the aluminum forging equipment at Alcoa's Cleveland, Ohio, works. Previously at this location, Alcoa had presses with capacities of 1500 tons, 3000 tons, and 15,000 tons respectively with no intermediate size unit available. The gap in press size quite often placed limitations on forging design.

The size of the press is indicated by its over-all height of 55 feet with 38 feet above floor level. The die area in which forgings can be produced is 11½ ft. long and 4½ ft. wide.

Among the unusual features of the 8000 ton press are its departure from conventional tie-rod design to increase rigidity and accuracy and its large die area.

Most big hydraulic presses are held together by a number of big threaded tie rods which act like giant bolts to prevent the press from pushing itself apart as pressure is applied to its dies. The 8000 ton press, which was designed and built by United Engineering and Foundry Co., is put together as though it were one giant rigid steel casting. Actually the unit is composed of a number of giant castings joined to act as one.

The big castings (seven of them weigh over 400,000 lb. each) are held together by unique shrink links. Rings are heated and fitted over lugs on each of the big castings. As they cool and contract over the lugs they hold the castings firmly together.

This one-casting rigidity permits extremely accurate guiding of forging dies and allows close tolerance work. The press weighs 3,900,000 lb., about twice the weight of a conventional single-cylinder 8000 ton press. The rigidity makes it possible to produce difficult unsymmetrical forgings without destroying the alignment of the press or impairing forging tolerances.

The 8000 ton United press has a working stroke of 6 ft. with a 3 in. per second pressing speed. The controls on the press are portable and can be relocated to allow the operator the best vantage point for controlling operation. Hydraulic pressure to operate the press is supplied by three, 700 hp. pumps and stored in a 600 gallon accumulator at 4500 psi.

The press installation includes two billet heating furnaces.

Student in general shop program at Stayton Union High School, Stayton, Ore. Out of 115 students in the course, 34 are girls

Photograph submitted by Arthur C. Corbett, instructor of industrial arts

Effects of weather on operation of 11 major industries is subject of new research series: *Climatic Criteria Defining Efficiency Limits for Certain Industrial Activities,* available from Department of Commerce's office of technical services, Washington 25, D. C. Based on research and observations in United States and Canada, study is said to be probably most complete investigation of its kind. — *Industrial Research Newsletter.*

Thirty-five million families in the United States own at least one automobile apiece. — *Petroleum Newsnotes.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

THE AVA CONVENTION IN ATLANTIC CITY

THE 49th annual convention of the American Vocational Association will be held on December 5 to 9, 1955, at Atlantic City, N. J.

Most meetings will be held at the Hadden Hall Hotel. As this convention, judging by the past, will be attended by large numbers, it is necessary to make reservations at once. For best results, write to the reservation manager, George Turcotte, Chalfonte-Hadden Hall, Atlantic City, N. J.

Aside from the fact that Atlantic City has much to offer the visitor in the line of entertainment, the educational features which will naturally be of greatest interest to the members of the American Vocational Association, will be outstanding at this gathering of the industrial arts and vocational education directors, supervisors, and teachers who will attend. The point to be remembered, however, is that only those who attend will reap the greatest benefit of the convention. Both industrial arts and vocational education have expanded their fields enormously since World War II. Those who want to see the latest in machine tools, equipment, materials, and supplies used in school shops will have a wonderful opportunity to do so. They will also have a chance to see men from industry demonstrate the machinery that is being shown. Besides this there will be exhibits of the newer types of visual and audio-visual aids that will help the teacher make clear to his students the intricacies of what he is teaching them. Here the visitor has an opportunity to see the projectors for motion pictures, slides, film strips, opaque visual aids, etc. In the catalogs that are obtainable at the various exhibits, industrial arts and vocational teachers and teacher educators will be able to study many helpful items that will assist them in their teaching jobs.

There also will be many exhibits by publishers who come especially to display books so that visitors can see just what is contained in them. And then there are the firms that manufacture the many hand tools and supplies that are used in the school shops.

Among these items are abrasive paper and cloth, sheet metal, archery supplies, automotive tools and supplies, shop benches, blowtorches, drawing boards and instruments, bookbinding equipment and supplies, brazing alloys, cabinets of many kinds, ceramic kilns and supplies, chair seating materials, craft project materials and supplies, plastics, automotive shop tools and testing apparatus, shop coats and aprons, industrial safety equipment, project kits, leathercraft tools and supplies, weaving looms, various kinds of lumber, and finishes for woods and metals.

Of course, this convention offers other values besides those gained from examining the items enumerated above. These accrue especially from visiting the exhibits, and meeting old and new friends. There will be special sessions dedicated to agricultural education, business education, distributive education, home economics, industrial arts, trade and industrial education, vocational guidance, and audio-visual education.

The various divisions have already arranged their programs so that the members attending the convention can be sure to hear excellent speakers present and discuss subjects that are packed with interesting and valuable material to broaden the visitor's outlook and help him with his own classroom problems when he returns to his school. Those who are especially interested in area vocational schools will be delighted to hear that that subject is receiving special attention at the Washington AVA office, as is also the question of the low salaries so frequently paid vocational teachers.

Then, too, the convention will have an opportunity to hear a discussion of educational television. Dr. William F. Rasche, director of the Milwaukee Vocational and Adult Schools, has developed a special program on the subject.

Ralph Steele, executive director of the joint committee on educational television, Washington, D. C., will deliver an address on the subject of "Educational Television for Today." Besides this there will be a panel who will elaborate further on this subject.

Really, no one interested in industrial arts and vocational education can afford to miss the convention to be held at Atlantic City, December 5 to 9.

BUSINESS, INDUSTRY, AND EDUCATION

EDUCATION, on the whole, is in a bad way. It is a topic about which much can be said, and many writers and speakers do so without much compunction whether their words help or damage the country-wide picture as it exists today.

The school, in general, is in an awful predicament. Grabbing avidly for the young secondary school and college graduate are business, industry, army, law, and medicine, with business and industry, being in a position to do so, offering monetary inducements which are exceedingly alluring to youth.

The school needs teachers, but it does not have the money to pay comparable salaries to those which are offered by business and industry. The average man, bowed down by high costs and taxes, naturally opposes paying still more for raising teachers' salaries and building new schools.

Business and industry are equally unwilling to shoulder higher educational costs. Looking at the dismal picture, one wonders to whom the children belong who are crowded into inadequate schoolrooms. When overburdened teachers ask for relief or higher wages, they are treated and looked upon as unreasonable complainers who ought to have more sense, and in order to make them see the light, their work is justly or unjustly criticized with cold-blooded severity.

When business or industry needs more help, they bid shamelessly for workers, offering wages and salaries that will bring results. The higher cost of carrying on their work is then added onto the cost of their products.

In the meantime, education is not to ask for more money, however. Teachers are to give more but not to ask more for themselves. The only problem seems to be how business and industry can advance while leaving the burden of educating the children of the community on the shoulders of those who conduct the school.

Is it not about time for business and industry to sit down with educators to discuss what is expected of the school, and then figure out what the required service is worth in dollars and cents, considering the preparation educators must make to undertake the preparation of the workers who must do the work so that all, not merely business and industry can prosper.

Problems and Projects

MAKING GLASS SLIDES ON THE LETTERPRESS

ALBERT MARINO

Pennsylvania Training School

Canonsburg, Pa.

Some time ago I was faced with the problem of printing some glass slides; each slide was to contain the words to a popular song. Since I did not possess a silk-screen unit I had to find a method to perform the job on a letterpress, using letterpress type. It proved to be easier and quicker than I thought possible. The task was accomplished by using the following simple steps:

1. Glass of the proper size was secured. Mine was 1/16 by 3¼ by 4 in.

2. Words to all the songs were set up in 10-point foundry type.

3. Imposition and lockup of "Song No. One" was made. In my case for a 10 by 15 C & P platen press.

4. Platen press and rollers were washed thoroughly.

5. *All* but *one* roller was removed.

6. Chase containing the type-form was placed in press.

7. Using job black ink the type-form was inked, by hand, with a brayer. CAUTION: Do not apply any ink on the press roller or disk.

8. Turn the flywheel, by hand, and run the single press roller over the inked type-form. Stop the roller a fraction of an inch below the ink disk.

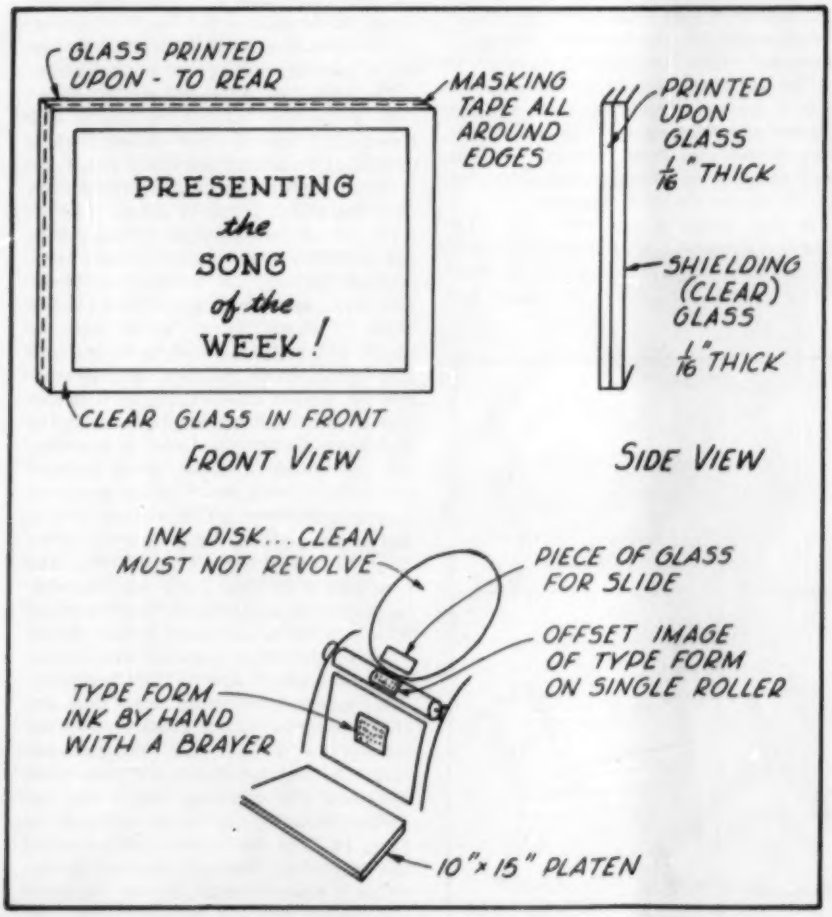
9. Take the piece of glass you wish to print upon and place it — flat, with the length horizontal with the chase length — at the bottom of the ink disk. You can use your own skill and judgment in determining the correct positioning of the glass. Scotch tape may be used to hold the glass in position. CAUTION: Revolving of ink disk must be stopped.

10. Slowly, run the roller (now holding the offset impression of the type-form) up and over the glass.

That's all there is to it! The piece of glass receives the offset impression very neatly.

To print the same song or a different song on another piece of glass you simply repeat the operations making sure, however, to clean off the press roller and disk each time. Remember: you always ink the type form, by hand, using a brayer.

To complete the glass slides place another piece of glass (unprinted and of equal size) over the printed one and, with masking tape bind and border the edges neatly.


GLASS PRINTED UPON - TO REAR
MASKING TAPE ALL AROUND EDGES
PRESENTING the SONG of the WEEK!
CLEAR GLASS IN FRONT
FRONT VIEW
PRINTED UPON GLASS 1/16" THICK
SHIELDING (CLEAR) GLASS 1/16" THICK
SIDE VIEW
INK DISK... CLEAN MUST NOT REVOLVE
PIECE OF GLASS FOR SLIDE
OFFSET IMAGE OF TYPE FORM ON SINGLE ROLLER
TYPE FORM INK BY HAND WITH A BRAYER
10" × 15" PLATEN

Making a glass slide on the letterpress

PROJECT DESIGN FOR THE INDUSTRIAL-ARTS SHOP

ALEXANDER F. BICK

Teacher in Milwaukee Schools

The Milwaukee-Downer College

The Stout State College, Summer Session

The making of chairs in the school shop is as practical as the making of other standard furniture. Contemporary chairs are forthright and technically simple. Furthermore, chair projects are a welcome variation when the overpromotion of other types of projects bring their production to a near saturation point.

One of the drawbacks to shop chair production was the need for upholstery. The contemporary style chair has rendered this operation simple. Beautiful, serviceable chairs are covered with white cord, light cotton wash line, and cotton duck, sewed to width. A most timely and a not costly cover is made of polyester plastic strip or sheet.

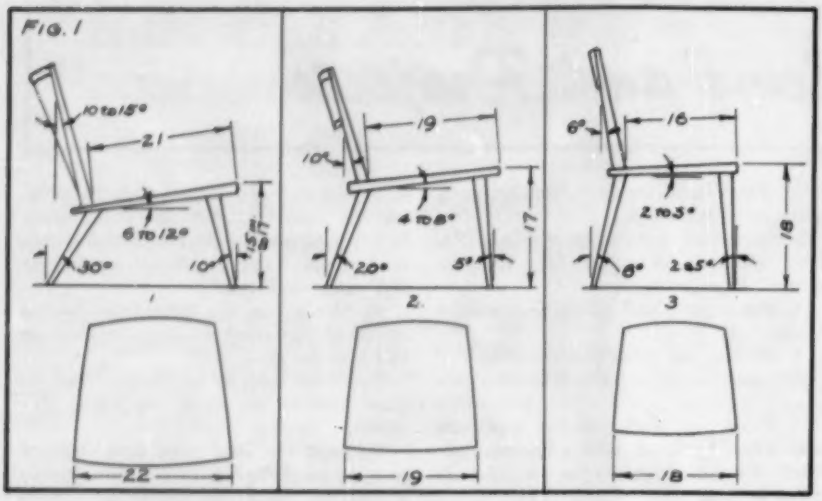
Contemporary chair construction takes many interesting new forms, as the latest interior decorators' journals show. The human body demands certain chair angles and dimensions for comfort in the three usual types of uses: resting, reading, writing (Fig. 1).

The important considerations in their construction are:

1. Strongly braced legs, set at practical angles.

2. Strongly braced back, set at a comfortable angle.

3. A frame that fits the form of the de-



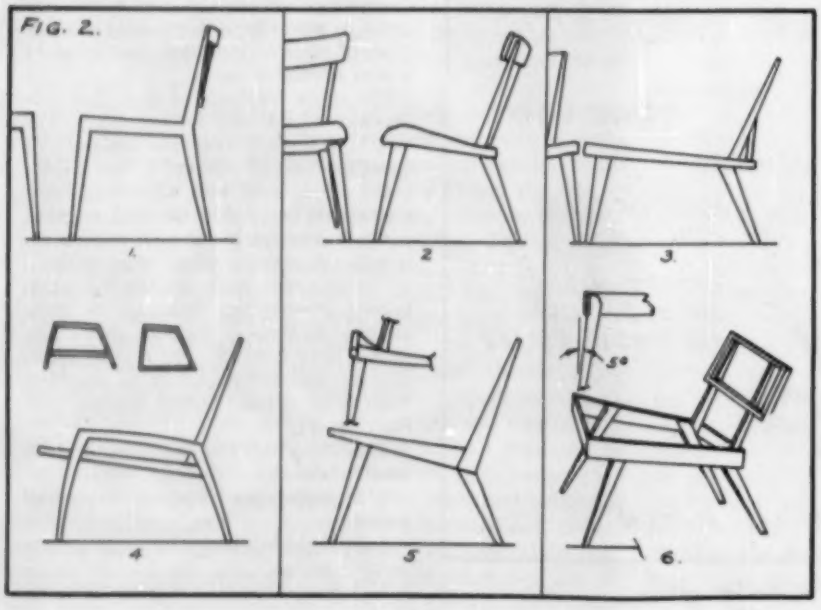
sign and is stiff enough to anchor all members, and also set at an angle for comfort.

Six general systems of construction may be used in the school shops. Of these, number 1 in Figure 2, is the traditional method, involving too difficult a joining for the average shop. All other systems are recommended as easily within the abilities of shop students.

Number 2 in Figure 2 has a solid, thick wood seat into which legs and back posts are doweled at proper angles shown. The dimensions of parts may vary slightly and the angles in all models may change a few degrees if the design follows the general form given. No. 3 has a flat frame of 1½-inch hardwood into which legs and back posts are doweled, the back having cross slats, and both seat and back requiring upholstery. No. 4 has a seat and back slung between two side frames, either three sided as shown, or varied as in the small auxiliary drawings. Notice that both seat and back have a two point bracing. No. 5 is a chair built on two side members, each consisting of a doweled seat and back member. These are held by three or four cross slats, all curved down or back; and the legs are glued and screwed to the sides of the frame. No. 6 chair is built on a frame of vertical 1-inch hardwood, the back and legs being glued and screwed to the frame as shown.

The legs on all the chairs taper outward 3 to 5 degrees. Within the limits given, a teacher may draw up a full-sized chair design on wrapping paper, checking his lines with those in the refined models illustrated in the current *Interiors* magazine.

A chair design is good when it is fresh and new in concept, when it is functional in all respects, when it is dignified in detail and excellent in execution and finish, and when it is simple to a degree that no further simplification is practical. These are the qualities to be found in contemporary work.



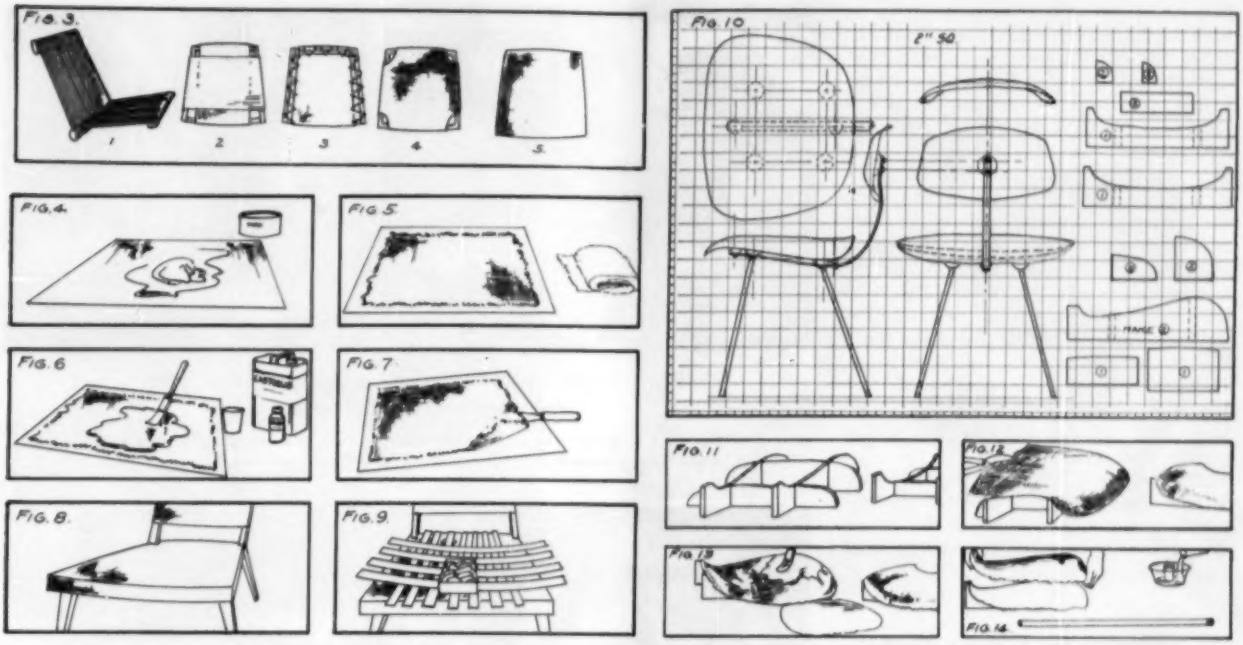
Five systems of covering are recommended, illustrated in Figure 3. The first is 5/16-in. diameter, white, hard finish cord wound close, perhaps forty winds totaling 150 feet of cord, costing about 65 cents per hank of 50 feet. This may be varied with winds at ½-in. intervals, crossing; or with 1-in. intervals. It may be varied also, using a light washline cord of heavier gauge than the cord, and wound at wider intervals.

The method of winding is shown, the return wind coming through bored holes in the end slats.

The second method of covering is shown as sewed duck, crossing over both the seat and back. Alternate methods are shown, using the same cotton duck as in 3, 4, and 5. In 2, 3, and 4, sewing of the proper hems on all exposed edges is required. In 2, rectangles of hemmed material are tacked crosswise to the frame. In 3, a small shape is hemmed and laced to the frame with cord through brass grommets set into the edge of the duck. In 4, the duck is cut to encircle the front legs and back posts, and then it is tacked to the frame. No. 5 shows the materials tacked solidly all around the frame. An alternative for No. 2 is tacking strips of webbing across the frame, weaving it. The price of webbing may be prohibitive.

The highly recommended method, however, in point of educational benefit and reasonable cost is the Fiberglas-resin method of covering, using either 2, 3, 4, or 5 of the methods shown in Figure 3. The resin has a high rating in industry, where it has proved itself equal to the many difficult problems that require strength plus extreme lightness. Its growth has, therefore, been phenomenal, a fact that is interesting to schools. It is a simple resin to handle with existing school equipment, and it is without doubt the most representative type of resin for schools to study. It affords a convenient and challenging addition to the shop program when used in combination with woods or metals, giving students new contacts with the chemical aspect of American manufacture. Therefore, it is a desirable experience for students to cover their chairs with the new liquid resin. The type used is the room hardening, Fiberglas, laminating resin, Castoglas. The method of its use is shown in Figures 4 to 9. Figure 9 shows the resin weighted with veneer slats and a box of weights while hardening.

An experience of more value than any of the foregoing, is one which involves the building of a reinforced Fiberglas-resin chair, like the one shown in Figure 15. A one-piece Fiberglas-resin chair was described in an article which appeared on pages 14–18 in the January, 1955, issue of this magazine. The one described in this article is easier to make; in fact, the forms and the leg structure both are within the ability of eighth-grade students. Sizes and



shapes are shown in Figure 10. Notice that graduations at inch intervals are to be extended by lines up and across. From these squares a full-sized drawing may be made, and procedures are shown in Figures 10, 12, 13, and 14. The wood form is made of 1-in. pine, covered with cotton cloth, then ¼-in. mesh hardware cloth which needs to be cut into and folded down to fit. Over this is troweled a rough and then a thin coat of plaster of Paris, which, when set, is shaved smooth with a spokeshave, and when dry, it is filed and sanded to a very smooth finish. Dust the surface and coat three times with Castoglas liquid resin mixture, the last coat leaving the surface of the mold glass-smooth. The final glassy surface is then treated for easy separation of the casting from the form. Coat the surface with car wax; then coat three times with Castoseal, a vinyl separating film; and last, add a wax coat. The form is now ready for chair casting. The sealing is repeated for each casting operation.

The casual reader may say, "This sounds very difficult." That may be true, but the sound is deceiving. Explaining processes in cumbersome words tends to make a careful description long and detailed. In the end, the reader has a complicated picture for a procedure, which, were it actually seen, is as simple as pushing a lawn mower. The truth of this was shown to many summer session teachers in nearly a dozen colleges during the past season. One try would convince anyone, both of its value as a school subject and of its ease of handling. The apparent barrier melts away.

To go on, with the casting procedure, cut paper patterns and then cut Fiberglas cloth, two pieces for the seat and two for the back. Then cut one piece each of onion sacking. Old sacks will serve well. The latter provides thickness and body to hold the liquid resin better. Place the cloth pieces over the forms, first a Fiberglas, second onion sacking, and third, Fiberglas cloth. Assemble all materials and tools, the liquid resin Castoglas, the hardener, paper measuring cups, stirring stick, measuring spoon, Castosil glass powder filler, brush, and a low jar with brush cleaner. All items named, including a specially prepared Fiberglas laminating cloth, are obtainable from the firm from which you buy the Castolite. Finally, provide twine and short metal bars for holding down the Fiberglas while setting.

Fig. 15. The finished chair

— Photograph by Milwaukee Commercial Photographers

Mix 24 ounces of Castoglas in glass jars with a total of 2½ teaspoonfuls of hardener, and add about 2 3-ounce paper cups of Castosil. Stir and apply over the Fiberglas with a brush.

Being heavy, the resin will run down at the edges. The Castosil filler will minimize the running, but it is well to instruct the student to brush up the drippings and return them to the areas being thinned out. When the dripping stops, the gelling is in process and the brush should be cleaned immediately in Castolite cleaner. In the meantime, and before the gelling, the mold should be tied at its bottom edges where the cloth materials are likely to crimp. The tying should follow the perifery of the casting. Weight areas in the deep curvatures of both castings with appropriate bars or weights.

In one hour after the gelling, loosen the castings from their forms with a pliable spatula, and when hard enough remove them entirely, trim them to a predetermined contour line with a tinner's shears and return them to the form and weight them until fully hard. This is probably next morning. It is easy to remove them from the form when hard without previous removal, especially when the edges are preloosened, but the trimming is much more difficult in the hard state, a saw being the only recourse then.

The leg structure is most practical when in a separate rigid unit. This may be a welded unit, and it may be a cross braced wood structure made of 1-in. maple dowel

plus 5/16-in. brass bar bracing, as shown on page 17 in the January, 1955, issue. In either case, the leg unit is attached to the chair through flangelike filled resin castings. In the case of the welded and the braced wood leg structure, in both of which the legs terminate in upright metal rods, a short length of ¼-in. pipe, plugged with wax, is embedded in the flange, and when the legs are of threaded pipe as the illustration shows, a ¼-in. pipe coupling is embedded in the flange, and the legs are merely turned into the thread. The rigid units mentioned first, are cemented into the embedded pipe with glass-fiber-filled resin. The casting into a pyrex dish is shown in Figure 14. Give the resin parts a color coat over a roughly sanded surface, and at the same time, fill the edges of the casting round and smooth.

This project will bring no end of return in both class and school interest, and will prove to any who will follow the simple directions all that was said in favor of using this timely, new material.

Fig. 1 at left. Working out the design. Fig. 2 at right. Making the experimental form

— Figures 1 to 6, courtesy of Dow Chemical Co., 135 S. LaSalle St., Chicago 3, Ill., which were printed first in the December, 1952, Dow Diamond

Fig. 3 at left. Sanding the form. Fig. 4 at right. The experimental trial run on an industrial vacuum forming machine

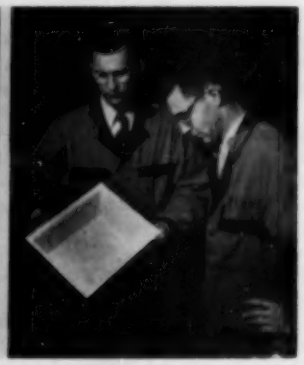


Fig. 5 at left. The formed sample. Fig. 6 at right. Trimming and inspecting

THE *INDUSTRY* IN INDUSTRIAL ARTS

ROBERT SWANSON

Assistant Professor of Industrial Education

Stout State College

Menomonie, Wis.

The content of industrial arts is of two types, craftwork and industrial work. The two are not distinct; the one shades into the other. The former is custom work; the latter production. The former emphasizes individuality of product; the latter standardization. *Craftwork* approaches the avocational; *Industrial work* the vocational. Both have a place in industrial arts; each supplements the other. There is little danger that craftwork will cease to be taught in our courses, but there are many courses that do not provide the student with much insight into the methods, materials, products, and processes of industry. It is not the purpose of industrial arts to provide specialized vocational preparation, at least at the lower levels. The *industry* of industrial arts is outlined by the American Vocational Association in our first national objective of industrial arts, *interest in industry*. This objective is defined as follows: "To develop in each pupil an active interest in industrial life and in the methods and problems of production and exchange."

Certainly, acquaintance with industrial work can be developed with lectures, films, and field trips, but there are vast opportunities to illustrate industry in the manipulative activities of the shop. There are many problems which the industrial-arts teacher faces in offering industrial-type experiences to his pupils in the school shop. In many cases the equipment of industry is large, expensive, and very specialized, not the kind of equipment particularly suitable in the school shop. Industry emphasizes production and the school shop teacher is more concerned with the educational aspects. The shop teacher is interested in teaching the principles involved and illustrating how things are done industrially. Learning value may be limited after one or two items have been produced.

What then can the industrial-arts teacher do to provide lifelike experiences in his interpretation of industry? In the first place, though much of industry is routine production by semiskilled workers, there is a good deal of problem solving in the de-

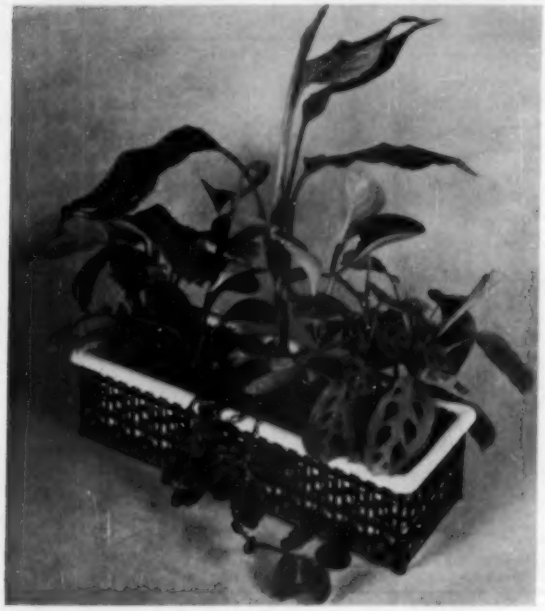


Fig. 7. A planter combining plastics and metal

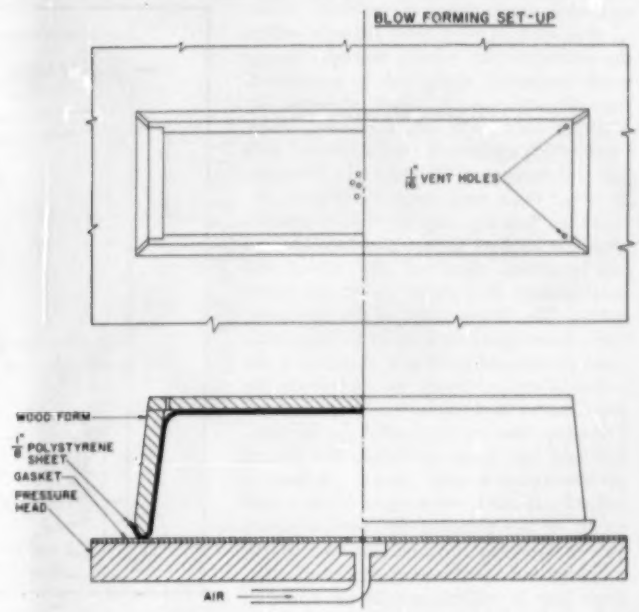


Fig. 8. How the planter was produced by blow forming

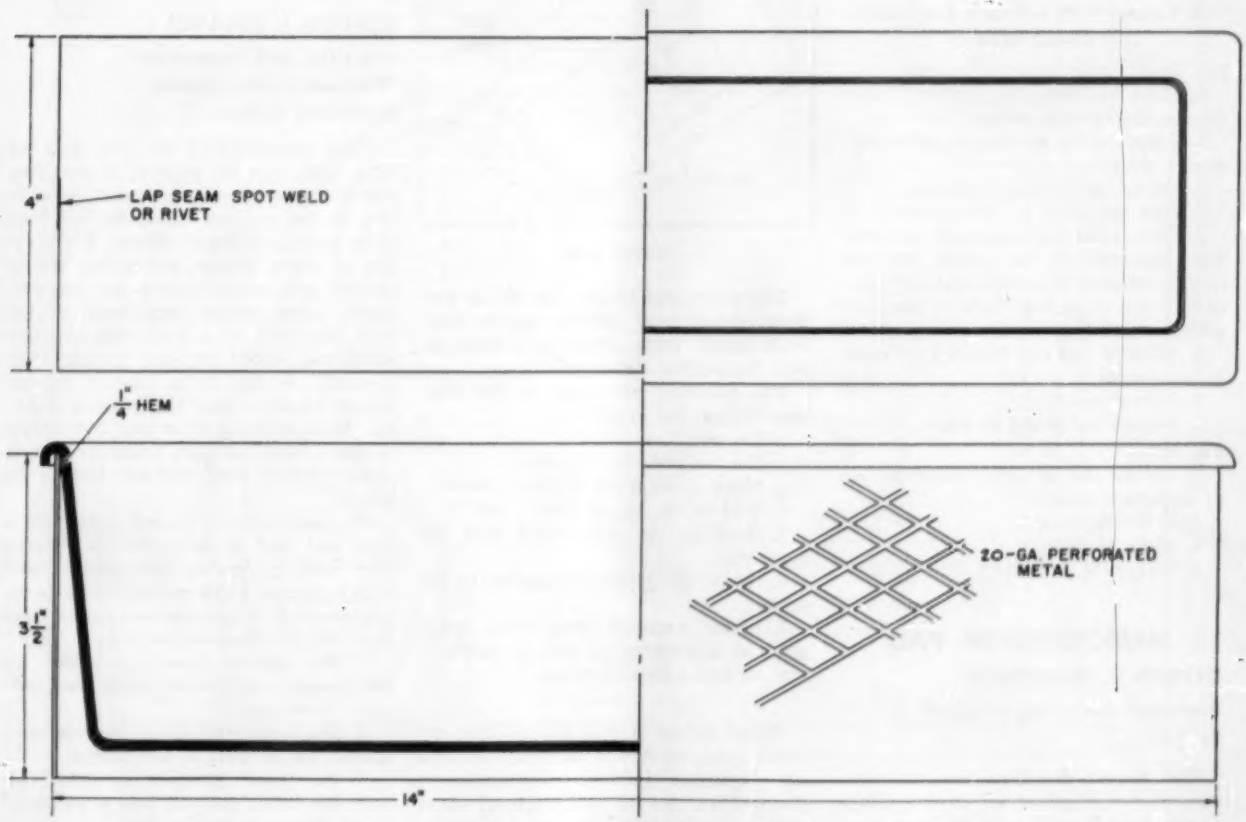


Fig. 9. The plastic planter in a metal base

sign and development of products. Much of this work is of a type entirely within the scope of the school. Second, though much industrial equipment is specialized, the specialization is often obtained by adapting basic tools and machines. Many times school equipment can be adapted with jigs and fixtures to illustrate the principles of larger more specialized equipment.

Let us illustrate from the field of plastics what can be done to interpret industry and yet overcome some of the educational shortcomings of a purely industrial organization. The development of the process of three dimensional forming of thermoplastic sheet has opened great new possibilities for industrial-arts students to experience the very content of the industry. Dow Chemical Company, one of the leaders in the plastics field, has shown pictorially the process of developing a new plastics product, a crisper tray for a refrigerator. Even a brief study of the steps in the process shows how easily they can be adapted to the purposes and conditions of the school shop. Each step is entirely within the realm of the industrial-arts student and shop.

The planter shown in Figures 7, 8, and 9 was developed as a school shop project by following the same procedure as outlined in the foregoing.

A Planter With a Plastic Tray and Metal Base

The Tray

1. Make the forms. See Figures 7 and 8 showing the forming setup.
2. Select and cut the plastic, ⅛-in. polystyrene sheet.
3. Set up the forming equipment.
4. Heat the plastic to 300 degrees F.
5. Place under form and apply air pressure, approximately ten pounds. Pressure may be supplied from some source of compressed air or merely from a hand tire pump.
6. Allow to cool and remove from forming equipment.
7. Trim flanges.
8. Smooth and polish all edges.

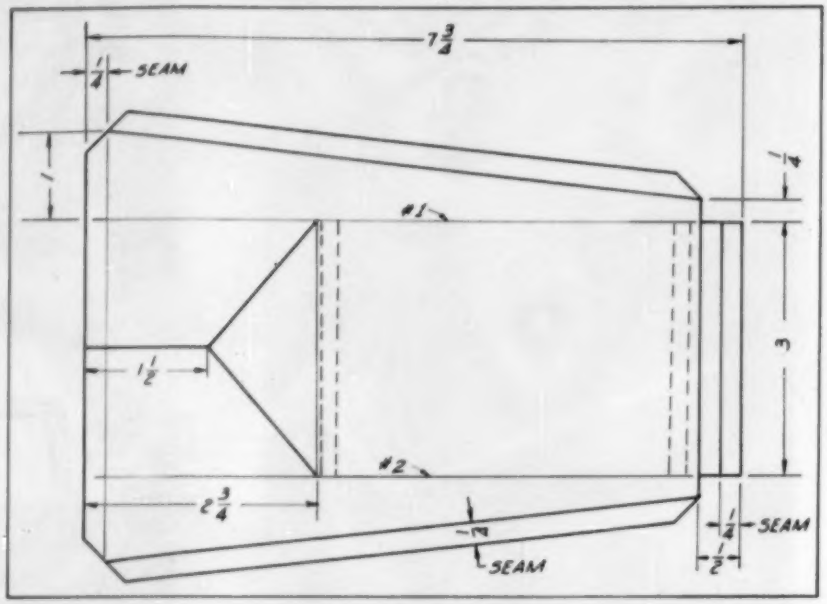
The Base

1. Lay out and cut metal; match pattern of perforated material.
2. Brake the corners.
3. Make lap seam.
4. Lacquer if desired.

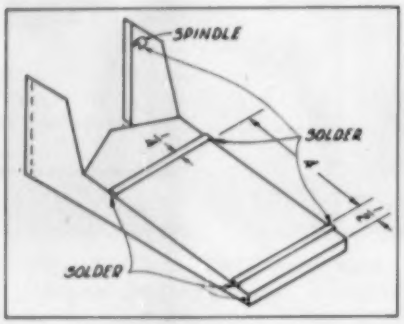
MEMORANDUM PAD

GEORGE V. CARDINALE
Roosevelt Junior High School
Erie, Pa.

The project described here was constructed out of galvanized sheet metal by an eighth-grade pupil using the basic sheet-metal working tools. The results were very satisfactory and interest in the project was high.



Details of the memo pad



Memo pad

This memo pad utilizes the adding machine type of paper which is sold by most office supply firms. These rolls serve as very inexpensive memo pads.

The following are steps in the construction of this project.

1. Lay out.
2. Cut out pad with tin snips.
3. Make ¼-in. seams at places shown.
4. Fold to 90 deg. at lines 1 and 2.
5. Bend up the sides which hold the paper roll.
6. Solder the paper roll spindles to the uprights.
7. Solder strips of sheet metal which serve as hold-downs, to pad, as shown.
8. Solder corners as shown.

Wood siding is still the leading exterior finish for American homes, reports the National Lumber Manufacturers Association. A type and grade of wood siding may be found for every purpose. It is low in cost from the standpoint of material and installation and can withstand all extremes in climate.

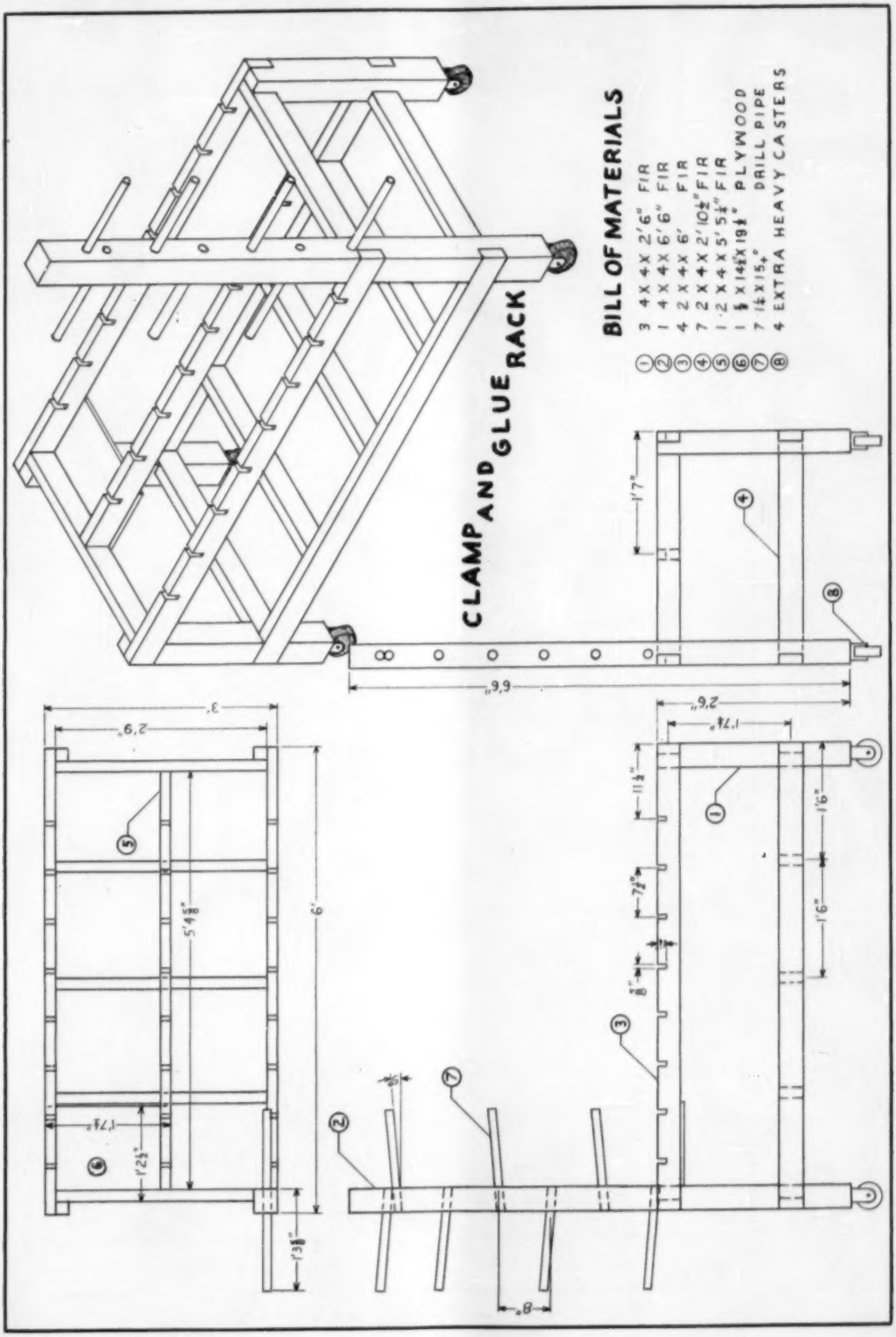
GLUE AND CLAMP RACK

ECKHART J. HEID
and
GORDON L. PAULSEN
Industrial Arts Department
Dickinson Public Schools
Dickinson, N. Dak.

Upon completion of our new shop we were faced with the problem of providing new or supplementary equipment in addition to the facilities which we had been using under previous conditions. The problem of clamp storage and gluing had in general been unsatisfactory for our purposes. When clamps were hung on the wall they took up a great deal of space which was needed for other storage. They generally weren't in a position to use where wanted — near the project, water, etc. Most annoying of all was that several students' time was often taken up to hold clamps where large surfaces had to be glued.

We have used the present system for a year and find it quite free of defects. The working drawing incorporates some minor changes which we believe to be an improvement in both use and construction from the rack that we have.

1. The notches provide a holder for the clamps making most gluing jobs "one-man" operations.
2. The lower cross braces provide loose storage for all types of bar clamps.
3. The "tree" provides an out-of-the-way, but handy place to hold *C* and hand screw clamps of varying sizes.
4. The storage shelf provides a good place to hold the glue, mixed and bulk, and the glue brush.



Details of the glue and clamp rack by Gordon L. Paulsen and Eckhart J. Heid

5. The space between the clamp holder and clamp storage shelf is sufficiently large to allow for expansion of storage space should the need arise. Two "trees" might also be used and not disturb the effectiveness for use of the clamping rack.

6. The heavy casters make for easy transportability of the rack either to where it is needed, or to a place where it could be stored, making more room for other shop activity.

If desired, a complete floor could be provided beneath the clamping rack to catch glue droppings. We have not found this to be a problem, however. The use of a paint similar to the color of the glue used will tend to retain an attractive appearance for the rack. Painting the pipes on the "tree" in varying colors and painting all or parts of the various clamps stored on each of the same color makes it much easier to keep the clamps in the desired arrangement most suitable for use.

Clamp and glue rack

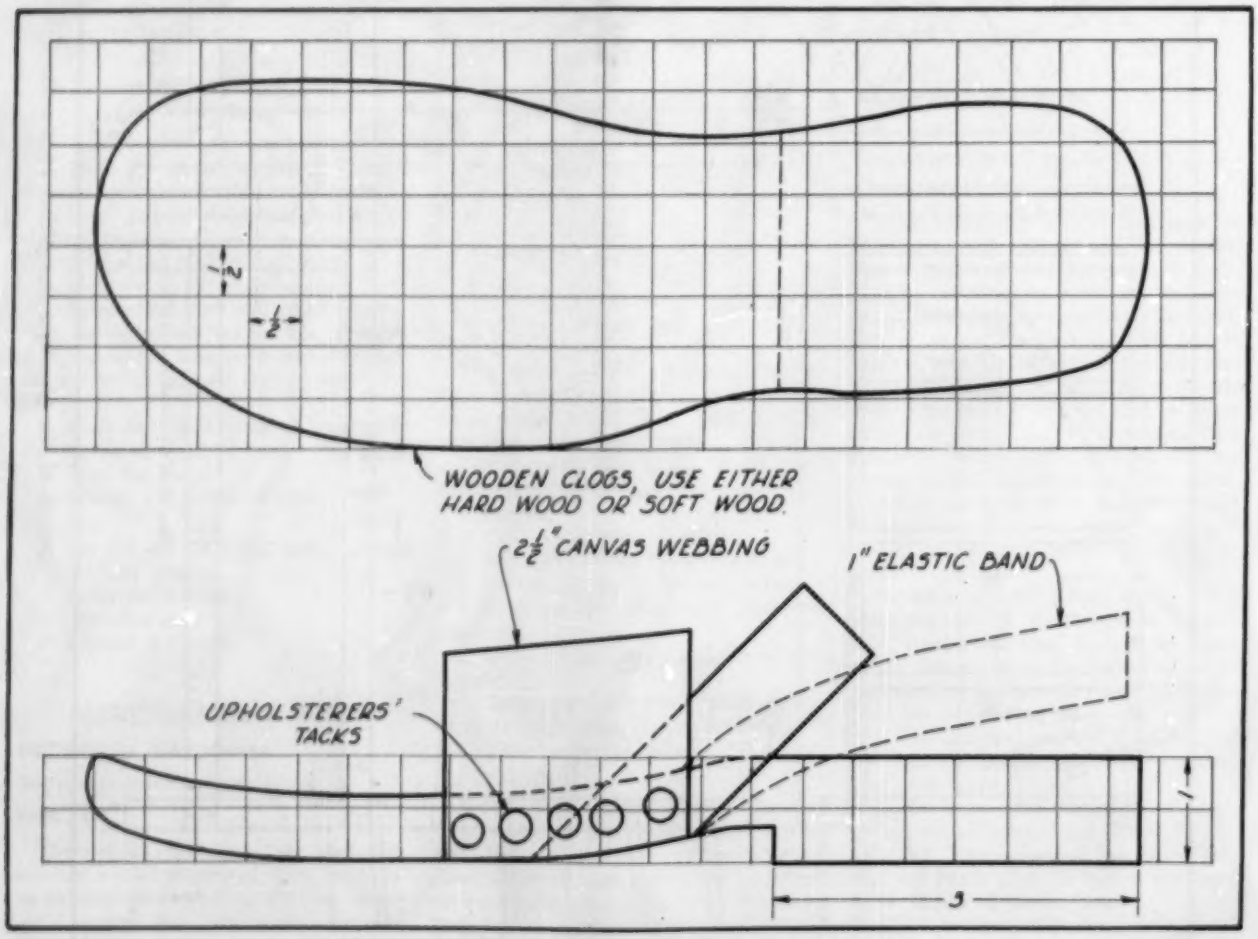
We might add that the cost was virtually none to our shop because we utilized an old lumber storage rack, cutting it up to suit our purpose. A discarded piano provided our casters and an old 1¼-in. well pipe supplied the limbs for the clamp storage tree.

THE USABLE SHORTS RACK

OWEN G. PARSONS
Instructor of Industrial Arts
Perth Central School
Amsterdam, N. Y.

In every general shop or wood shop the instructor is sooner or later faced with the problem of storing the usable shorts in lumber that are the by-products of the construction of larger projects.

An ideal shorts rack must have several features if it is to be of any permanent value. It must keep the shorts in neat arrangement, for appearance' sake. It must make the placing of shorts in the proper place very simple in order to invite the co-operation of the students. It must allow a good view of the ends of all stock so the proper width and thickness may be selected without handling several pieces. It must be arranged so the approximate length of each piece will be known without actually meas-



Wooden clogs by Louis Barocci, High School, Cudahy, Wis.

uring the stock. It must clearly show the student which pieces should be stored in a given place and which pieces are scrap and should be discarded. It should operate efficiently to the point where the instructor need not spend time sorting out and arranging the rack to keep it operating correctly.

There are three fairly general types of shorts storage used in shops today. Figure 1 shows how the common cardboard carton is used in an attempt to keep the stock in one place. This, of course, is the poorest type of arrangement and makes it all but impossible for usable shorts to be selected for use. This method also causes a great deal of costly waste.

Figure 2 shows the common stand up type of rack for shorts. This rack is tapered with the deepest shelf at the bottom and the narrowest shelf at the top. However, even the deepest shelf will barely accommodate a two-foot piece of stock. Over a short period of time most of the wood simply becomes thrown on the top shelf and it also collects pieces of scrap that are not usable. The rack presents a very poor appearance and does nothing to aid the student in developing habits of neatness. It uses a great deal of the instructor's time in trying to keep it organized.

Figure 3 shows a well-constructed shorts bin on casters. The bin itself is attractive and neat when the cover is closed. However, to obtain a piece of stock, a time consuming job of unloading and reloading must be undertaken. This bin will not accommodate long pieces of stock but will accommodate pieces no bigger than shavings as evidenced by the overflow on the floor that missed the bin. When finally full the instructor must once again sort through the stock eliminating the scrap to make room for new usable shorts and another collection of scrap.

Let's look at the advantages of the shorts rack suggested by Figure 4.

1. Wood may be stored neatly and efficiently.

2. A piece of wood may be selected of the correct dimensions without sorting through all the wood in the shorts rack.

3. Wood that is often thrown out because it is in the way, now becomes the basis for many small projects.

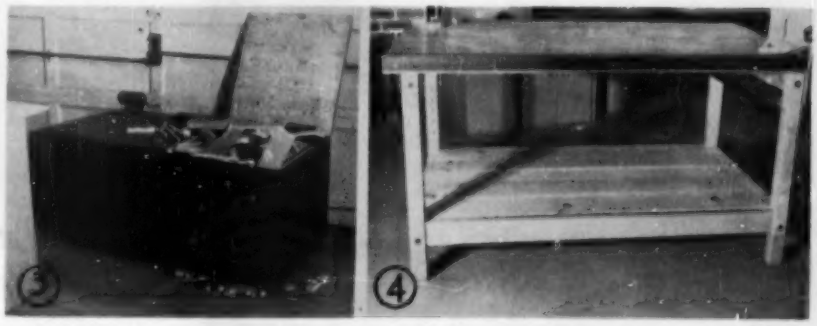
4. A piece of stock may be selected that is most nearly correct in size, thus eliminating waste, which is important in view of today's lumber prices.

5. The student develops better shop habits because he learns that neatness need not be time consuming, but will actually save time.

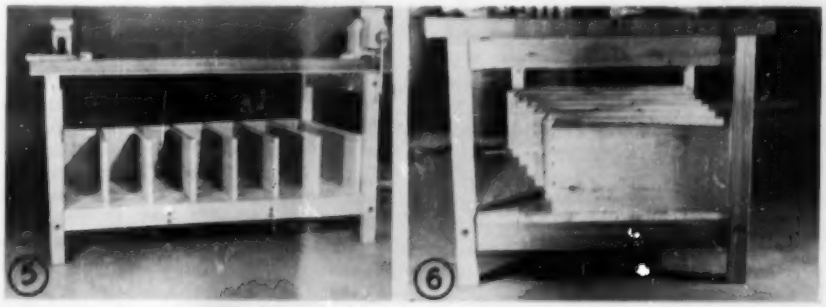
6. A good shorts rack will make it possible for the instructor to use his time elsewhere instead of sorting out the stock rack every few weeks.

The basis for this shorts rack is the bottom of a bench, fairly close to the milling section and large lumber storage if

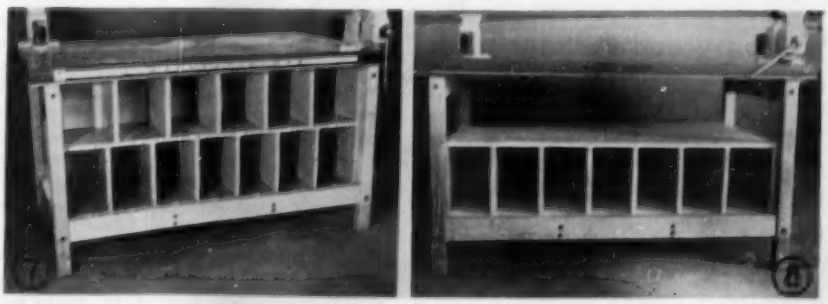
At left, the poorest method of storing shorts; at right, the next to poorest method of storing shorts



At left, a scrap collector on casters; and at right, a shorts bin that has many advantages



At left, dividing the space at the bottom into compartments; at right, the side view of the dividing partition



At left, the second layer of bins; at right putting on the second floor

possible. Most shops have such a bench available like the one shown. Almost any bench bottom with a usable width of 3 feet and a length of several feet will do. For those who do not have such a bench, a suitable frame work can be built against a wall that will duplicate the results obtained in the bench method. Figure 4 also shows that a sturdy bottom was constructed as the first step.

Figure 5 shows how the first seven compartments are constructed. These compartments are 7 in. wide, 10 in. high and range in multiples of 2 in. from 22 to 34 in. in depth.

Figure 6 shows clearly how each bin will accommodate a different length piece of stock within a 2-in. limit.

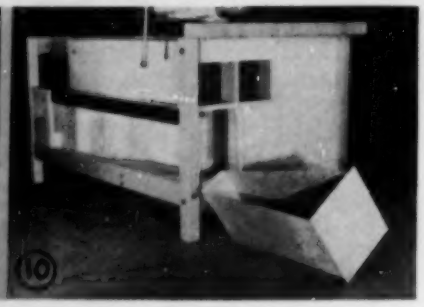
Figure 7 shows how the second floor was constructed on top of the first layer of bins.

Figures 8 and 9 show the second layer of bins, containing 6 bins each with a width of 8½ in., a height of 10 in., and a depth in multiples of 2 in. from 10 to 20 in. If your situation will allow it, changes can be made in the number or size of the individual bins.

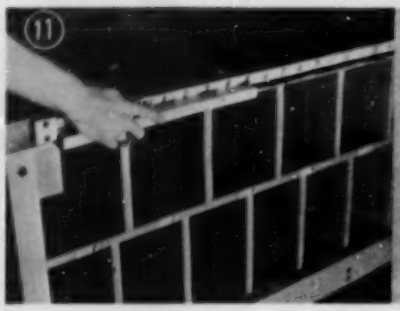
Figure 10 shows how the two longer bins 36 and 38 in. are constructed to use the remaining space behind the top layer of short bins. A tapered drawer was constructed to catch the small pieces of wood that can be used but will not fit in the main part of the shorts rack. The back and sides of the bench are then sealed with plywood to create a neat appearance.

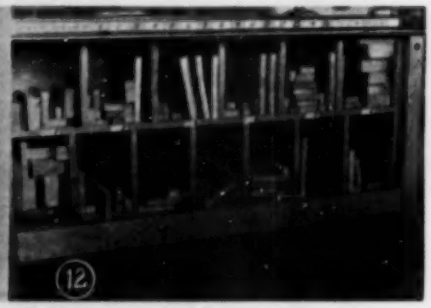
After painting the rack, each bin is given a number starting with No. 1 and going to No. 13 on the front. Bins No. 14 and 15 are labeled at the end of the bench. A small block of aluminum 1¼ in. square is then fastened to the edge of the bench as shown in Figure 11. From this block a stripe of paint 46 in. long is painted on the edge of the bench. White and yellow paint was used to show the different divisions. The first 8 in. of white was labeled "Grain (with arrow pointing), this size in scrap box." Now the next 2 inches were painted yellow, and in multiples of 2 inches up to 38 in. were painted alternately yellow and white. Then each of these 2-in. divisions received a number from 1 to 15 to correspond with the numbers on the bins below. The final 8 in. contains the words, "Place in overhead rack." This is where our long lumber is stored in the shop.

In operation, the student simply places a piece of wood against the stop with the grain running in the direction of the painted stripe (Figure 11). If the piece is less than 8 in. long, it is thrown in the scrap bin as stated on the stripe. If the piece is longer, the end will fall on a square with a number, the stock is then placed in the bin with the corresponding number. If the stock is over 38 in. long it will fall on the painted stripe that says "Place in overhead rack." This system has given us three divisions: (1) scrap — to be thrown away, (2) usable shorts — in the shorts rack; (3) long lumber — replace in lumber rack. As for the usable shorts they now stand sorted in bins with a difference in length at most of only 2 in.



At left, how the second layer bins are divided; at right, the tapered drawer for the smaller pieces of scrap





At left, numbering the bins; at right, bins after six week's use

To select a piece of stock from the shorts rack the student simply looks on the label of the bins for the length needed. For instance, bin No. 1 contains 8 to 10 in. pieces and it is so stated on the label. If a student needs a piece of stock 10 in. long he goes to bin No. 2 where all pieces are 10 to 12 in. in length, he measures the ends for proper width and thickness and removes the piece desired. If the proper width is not there he simply moves on to a higher numbered bin until it is found. It has been found that if a short piece cannot be found in the first two or three bins, it is better for the student to go to bin 12 through 13; this still will leave a piece long enough to be placed in one of the shorter bins ready for some other student's use.

Figure 12 shows the rack after 6 weeks of constant use with no rearrangement having been done whatsoever. I believe that the student knows he must place the stock in one of the bins and is willing to take one second to place it in the correct bin, rather than to be the one to disturb the neatness of such a rack. The student has also learned that obtaining a piece of stock with this system is simple and fast.

My personal opinion is that our shorts problem has been solved and I am fully satisfied and a little bit elated over the fine job the rack is doing.

GRINDER SAFETY INFORMATION AND TEST

LOUIS J. ENOS
Metal Shop Instructor
Lincoln Junior High School
Sacramento, Calif.

Test Yourself on Grinder Safety

(*Check the right answer.*)

	Yes	No	
1.	..	..	Do you always ask for permission to use the grinder?
2.	..	..	Do you roll up your sleeves and avoid wearing loose clothing or a necktie when using the grinder?
3.	..	..	Do you ever operate the grinder without wearing goggles or a face shield?
4.	..	..	Do you inspect the grinding wheel for chips and cracks before starting the job?
5.	..	..	Do you check the tool rest to be sure it is adjusted close (1/16 in.) to the wheel?
6.	..	..	Do you hold the object you are grinding with pliers?
7.	..	..	Do you keep a water pan near and quench objects being ground to prevent burns?
8.	..	..	Do you stand in front of the grinding wheel when grinding?
9.	..	..	Do you hold the object to be

ground on the tool rest with both hands, using a light firm pressure?

10. . . . . Do you leave the grinder unattended while the power is on?
11. . . . . Do you keep from using the sides of the grinding wheel?
12. . . . . Do you strike the grinding wheel?
13. . . . . Do you avoid grinding metal that does not spark?
14. . . . . Do you only grind metal that is (⅛ in.) or more in thickness?
15. . . . . Do you refrain from grinding very small objects and use a file instead?
16. . . . . Do you stand close to the grinder to watch someone else operate the machine?
17. . . . . Do you engage in "horseplay" and scuffling around the grinder or in the shop?
18. . . . . Do you wait until the grinding wheel has stopped turning before cleaning the machine with a brush and dustpan?
19. . . . . Do you turn off the grinder when the job is done?

How to Prevents Accidents

The shop instructor must know you are going to use the grinder.

Ask for permission to use the grinder.

Proper clothing helps prevent accidents

Roll up your sleeves and do not wear loose clothing or a necktie.

Operating the grinder without eye protectors will cause eye injuries.

Wear goggles or a face shield when using the grinder.

Observing grinder safety rules is a safe practice.

Inspect the grinding wheel for chips and cracks before starting the job.

Check the tool rest. Be sure it is adjusted close (1/16 in.) to the wheel.

Keep water pan near and quench objects being ground to prevent burns.

Hold the object to be ground on the tool rest with both hands, using a light firm pressure.

Refrain from grinding very small objects; use a file instead.

At no time strike the grinding wheel.

Keep from using the sides of the grinding wheel.

Avoid grinding metal that does not spark.

Only grind metal that is (⅛ in.) or more in thickness.

Never leave the machine unattended while the power is on.

Stand to the side of the grinding wheel when grinding.

Use no pliers to hold the object you are grinding.

Turn the power off when the job is done.

Standing in danger areas, *horseplay*, and scuffling will result in accidents.

Avoid standing close to the grinder to watch someone else operate the machine.

A good housekeeper seldom has accidents.

Wait until the grinding wheel has stopped turning before cleaning the machine with a brush and dustpan.

RUBBER STAMP MAKING

LOUIS W. SHAPIRO
Dunbar Trade School
Chicago, Ill.

The art of making rubber stamps has been handed down from father to son for many years. As a craft the process of making rubber stamps is very much a part of the graphic art unit of a general shop or a print shop. Professional results can be obtained with small equipment and little cost. The most important phase of rubber stamp making is the mould as the rubber die which is the rubber stamp can be no better than the mould. As in every art or trade, expertness in making rubber stamps

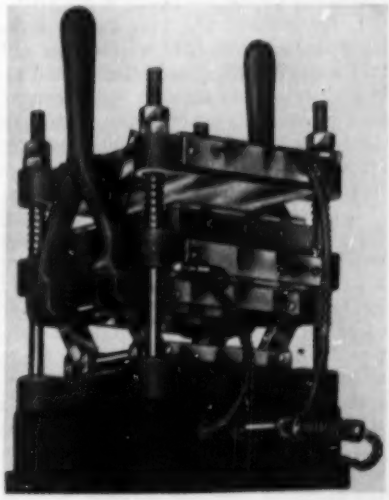


Fig. 1. Vulcanizing press

is achieved through practice and careful attention to details. Materials and equipment for making rubber stamps are reasonably priced and easily available. The size of the chase will determine the number of lines to be moulded and therefore the number of rubber stamps to be processed at one time.

Today, with our modern improvements of equipment, material, and production, the art of rubber stamp making has been simplified. When starting, experiment with one or two lines for practice and technique without wasting much material.

There are three methods most commonly used in making rubber stamps: (1) the moulding compound method, (2) the matrix

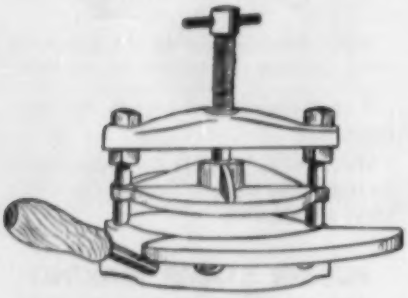


Fig. 2. Small press with electric or gas heater

or plastic method, and (3) the Evatype method. The plastic and Evatype methods are the cleanest and easiest to use. The moulding compound method is the cheapest but takes more time and cleanup is necessary.

Four steps are necessary for making rubber stamps with the exception of the Evatype method. The steps are: (1) preparation, (2) making the mould, (3) vulcanizing the rubber stamp, (4) mounting the rubber stamp.

The Moulding Compound Method

1. *Preparation.* The first step in making a rubber stamp is to set the type and take a proof. The type is then locked up in a chase or held together with string or a rubber band to keep from spreading. Take a proof and check carefully with the copy for errors and defective composition before proceeding to the next step.

2. *Making the Mould.* Mix the moulding compound to a stiff consistency with water. Use enough compound only to cover a small steel or galvanized iron plate (3 by 5) about No. 14 gauge to a thickness of ¼ in. allowing ½ in. margin of compound all around the type. Smooth the mixture down uniformly with a knife or spatula. Moulding compound comes in three different types, water mix, Dextrine mix, and Gluten mix. The water mix compound is the cheapest and easiest to use for beginning purposes. Caution must be taken not to let the compound get too

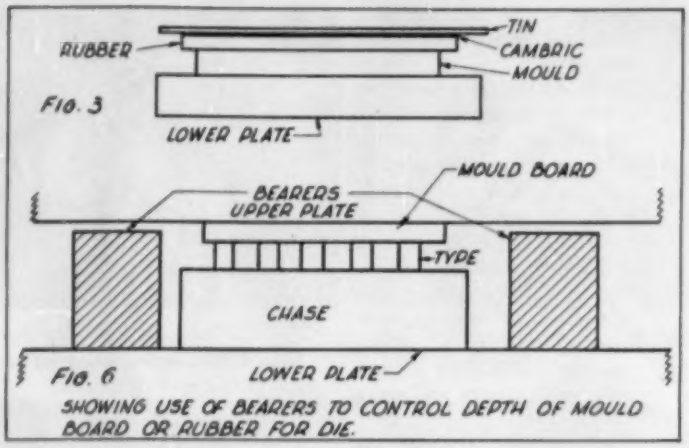


Fig. 3 and 6

hard or to make the impression when the compound is too soft.

For the first impress taken lightly, a thin sheet of rubber called a rubber dam is placed on the compound and the type pressed lightly into the compound. Lift the type off immediately and note if all the letters have made contact. If not the compound may be pushed up at the low points and a second impression taken through the rubber dam. Again lift the type and brush over it with kerosene, using a soft brush or lint-free cloth. Now take an impression with the bare type, pressing it down into the compound a little deeper than the impression taken through the dam, but not more than ⅛ in. deep. Two or more bare type impressions should be taken. However, use kerosene on the type before each impression.

Since the moulding compound sets in a few minutes, no time must be lost between the mixing and the final impression. Examine the mould carefully for defects. If there are any, make a new mould, because the rubber stamp can be no better than the mould.

When the mould has become well set, pare away much of the margin and the high spots with a sharp knife. Never shave the surface below the type shoulders. Place the mould in a cool dry place to harden which should take between 4 to 6 hours. To hasten the drying process place the mould over a heater or in an oven. Apply little heat to start with as too rapid application of heat will cause the mould to explode. Complete drying should take place in about 30 to 45 minutes depending on the application of heat and size of the mould.

Test the mould by scratching it outside the impression with a sharp knife or steel point. If it seems to be brick hard, it is ready to use.

3. *Vulcanizing the Rubber Stamp.* Heat from an electric or gas burner up to 350

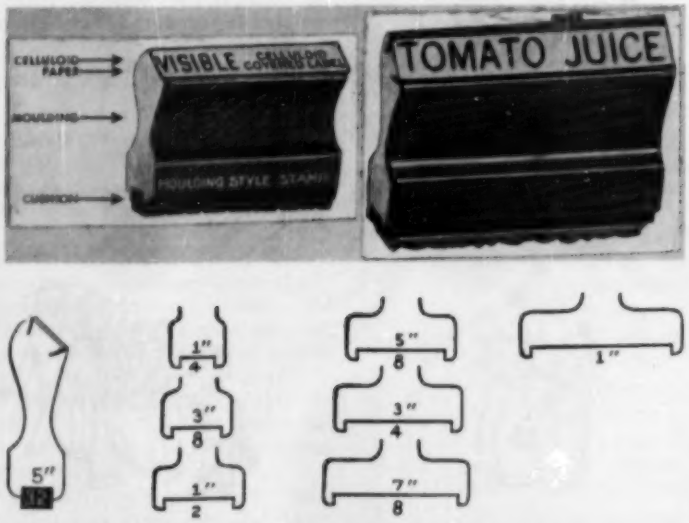


Fig. 4. Moulding strip mounts and sizes

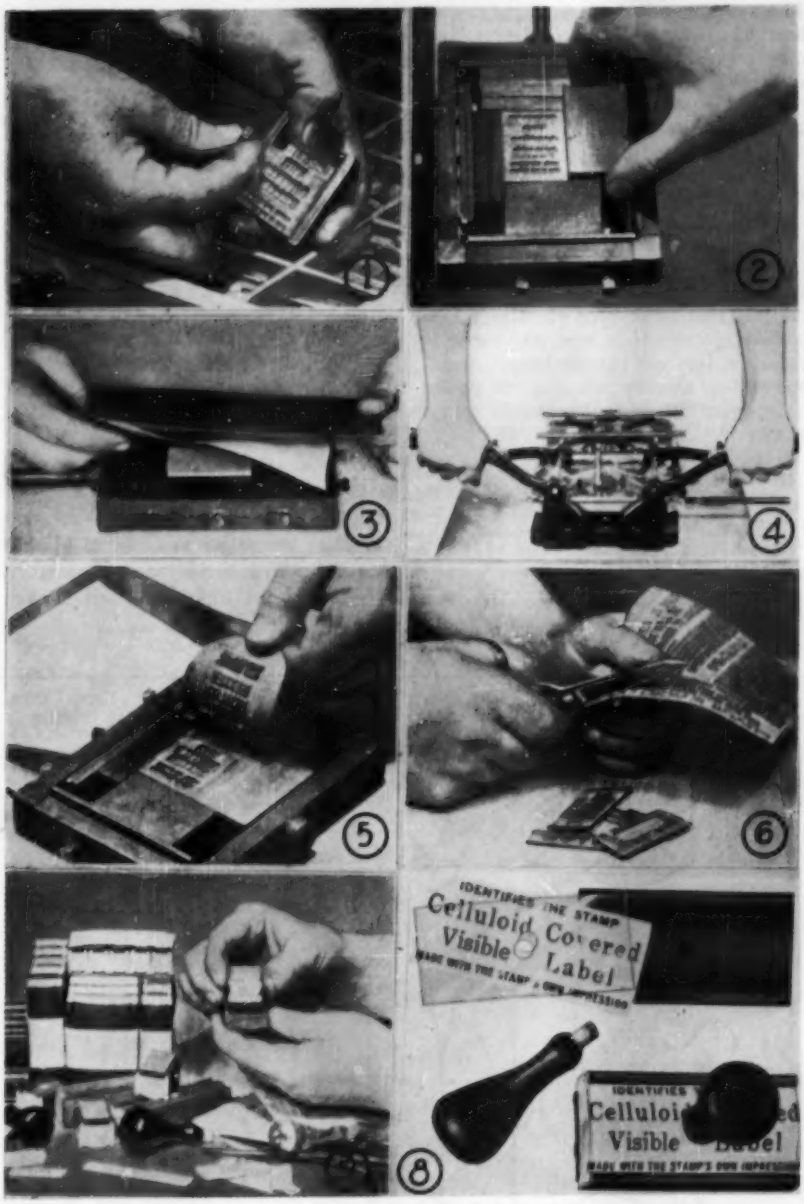


Fig. 5. The Evatype method

1. Set type; 2. Lock up; 3. Lay rubber on type; 4. Press rubber into type on heated press; 5. Pull vulcanized rubber from mould or type; 6. Separate and trim stamps with scissors; 7 and 8. Mount stamps on cushion and handle

degrees Fahrenheit is essential. A small press or some way of exerting pressure between two plates is necessary to force the unvulcanized rubber into the die for vulcanizing. Heat the press to 300 deg. F. An ordinary oven thermometer will serve to check the temperature of the press or vulcanizer.

Cut a piece of stamp rubber slightly larger than the mould impression. Better results will be obtained by leaving the cambric on the gum and placing the opposite side to the mould. The gum should be on top of the mould.

Place a piece of tin over the rubber and slide the whole combination as near the center as possible. Bring the pressure down slowly so as not to trap air in the mould. Press the top plate down reasonably hard and note the time. Full vulcanization will take place in 5 to 6 minutes.

After removing the mould and stamp from the vulcanizer, first lift off the tin plate and carefully peal off the stamp by pulling it up at each corner and finally from the die. A small pair of pliers are useful in handling it at this stage. After cooling, trim the tie with scissors as close as possible to the outline. Remove the cambric from the back and proceed to the mounting.

In timing the vulcanization, start by trying 2½ minutes. If at this time the rubber seems firm and all the characters are smooth and the mould releases the die easily, it should be an indication of the correct time. If on the other hand, the rubber has a tendency to stretch and appears soft it has not had sufficient heat. It can be further vulcanized by laying the die face up on the lower plate of the vulcanizer for a few seconds.

Proper vulcanization can be tested before the rubber is removed from the mould by pressing down on the overflow with some blunt instrument. If the rubber springs up with no trace of the impression, it indicates that it is done.

The following is a table of vulcanizing time and heat:

331 degrees	2 minutes
324 degrees	3 minutes
316 degrees	3½ minutes
308 degrees	4 minutes
305 degrees	5 minutes
298 degrees	6 minutes

4. *Mounting the Rubber Stamp.* The mounts for the stamps are made of mount strips and handles or grooved moulding. The grooved moulding is most convenient to use especially if facilities for drilling holes are not available. The grooved moulding is complete with handle grip, rubber cushion mounting, and index. The size of the mounts vary from 5/32 in. to 1 in. They come in 18½-in. lengths.

Select the smallest mounting that will receive the stamp. Saw off a piece of the right length. Remove the cambric from the rubber and apply rubber cement to the smooth surface of the die and to the rubber cushion of the mount. Allow the rubber cement to dry on the two surfaces for 60 seconds and press them together. With a rubber stamp ink pad, take an impression and attach it to the handle and the stamp is ready for use.

The Plastic or Matrix Method

Of all the plastic moulding materials Bakelite seems to be the more generally accepted. Speed and use of less skilled mould makers are two very important reasons why Bakelite mould material is rapidly replacing the moulding powder. A Bakelite mould is also faster because the time required for preheating it is less than the time required to dry a compound mould.

Bakelite is available in one thickness and is 20 by 50 in. in size. The average sheet weighs about 7 lb. The original sheet is cut into smaller pieces for easier handling, and the size piece needed is then cut off. This Bakelite requires only 1½ minutes of preheating before making the impression and cures at about 300 deg. F. in 10 minutes. This method makes a permanent mould if more than one stamp is needed.

Preparation. The type is set and locked in the chase the same way as for the moulding compound method. Instead of using moulding compound, Bakelite matrix is used.

Making the Mould. Cut a piece of Bakelite amply large enough to cover the type surface. Place the Bakelite on top of the type with the brown side touching. The black side is facing up. Place a piece of paper over the black side to prevent the bakelite mould board from sticking to the upper plate of the press. See Figure 3.

Place the vulcanizer on a heater and bring up to about 300 degrees. Push the chase into the center of the vulcanizer and screw down until the type barely comes in contact with the mould board. Allow to dwell on this for 1½ minutes, then press down so that the shoulders of the type are slightly embedded. Do not try to tighten the press all at once but tighten a little several times. This will let the type press into the matrix slowly as it softens. Let the matrix cure in this position for ten minutes. After the impression has been made, remove from the press and allow to cool. The mould is then ready for use.

Vulcanizing the rubber. The same procedure for vulcanizing the rubber is followed as previously outlined for the moulding compound method.

Mounting the Stamp. The stamps are then mounted on the stamp mounts following the instructions for the moulding compound method.

The Evatype Method

The Evatype method, sometimes called the reverse type method, is an improved metal mould method of simplified rubber stamp making. It is the fastest and simplest method for making rubber stamps.

No mould is needed in this method as each piece of type makes its own mould. Evatype is the reverse of regular type. It is merely sunken metal type and makes its own mould when the letters are set together. Evatype differs from printers type as it is .875 high and printers type is .918 high. The regular printers spaces, slugs, rule and furniture cannot be used with Evatype due to its height. The type is set in the composing stick in the usual way reading from left to right.

This method is the simplest of the three methods described. With this method it is unnecessary to make messy expense producing, time consuming clay compound moulds.

Only three steps are required in the making of rubber stamps using Evatype. Step (1) and step (2) are combined into one. Step (3), vulcanizing the stamp follows the same procedure as the other two methods and step (4), mounting the stamp likewise.

CAUTION: Metal or wood bearers, metal preferred, are sometimes necessary to control the depth of the mould and the die. These bearers are placed between the upper and lower platen of the press alongside the chase. The bearers also help to control an equal pressure during the moulding and vulcanizing steps.

General Hints: As the bulk of stamps fall within certain sizes, it might be well to divide the chase into columns of 9 picas for 1½-in. stamps, 12 picas for 2-in. stamps; 15 picas for 3-in. stamps. Endorsement stamps for bank purposes are never set over 15 picas wide. Address stamps for envelopes are usually set 18 picas wide using 18 pt. type. It is commonly agreed that 10 pt. type will satisfy any user who specifies ⅛-in. type (this measure means the face and not the body). 12 pt. type with a shoulder will pass for ⅛ in. 36 pt. type with a shoulder would be ⅜ in., etc.

Sources of supplies:

G. A. Pratt Co., 1108 W. Chicago Ave., East Chicago, Ind.

American Evatype Corp., Deerfield, Ill.

Consolidated Stamp Mfg. Co., 1123 W. Washington Blvd., Chicago, Ill.

Louis Melind Co., 3524 N. Clark St., Chicago, Ill.

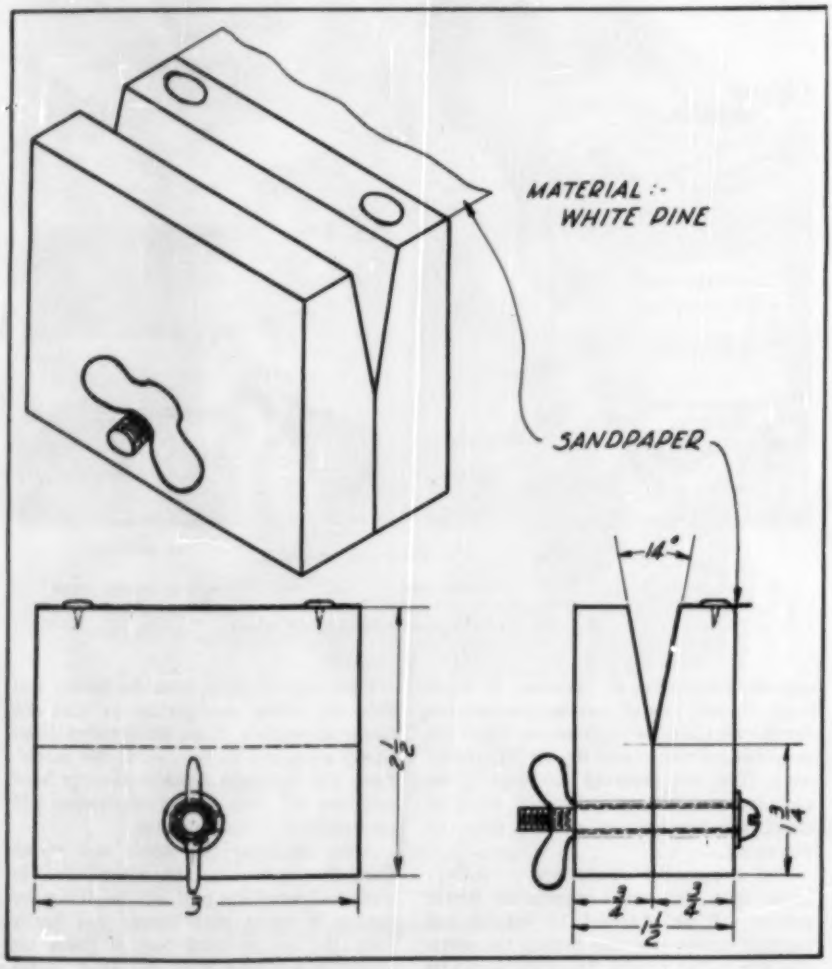
CHISEL POINT SANDER

VERNON D. WILSON
Drafting Instructor
Mansfeld Junior High School
Tucson, Ariz.

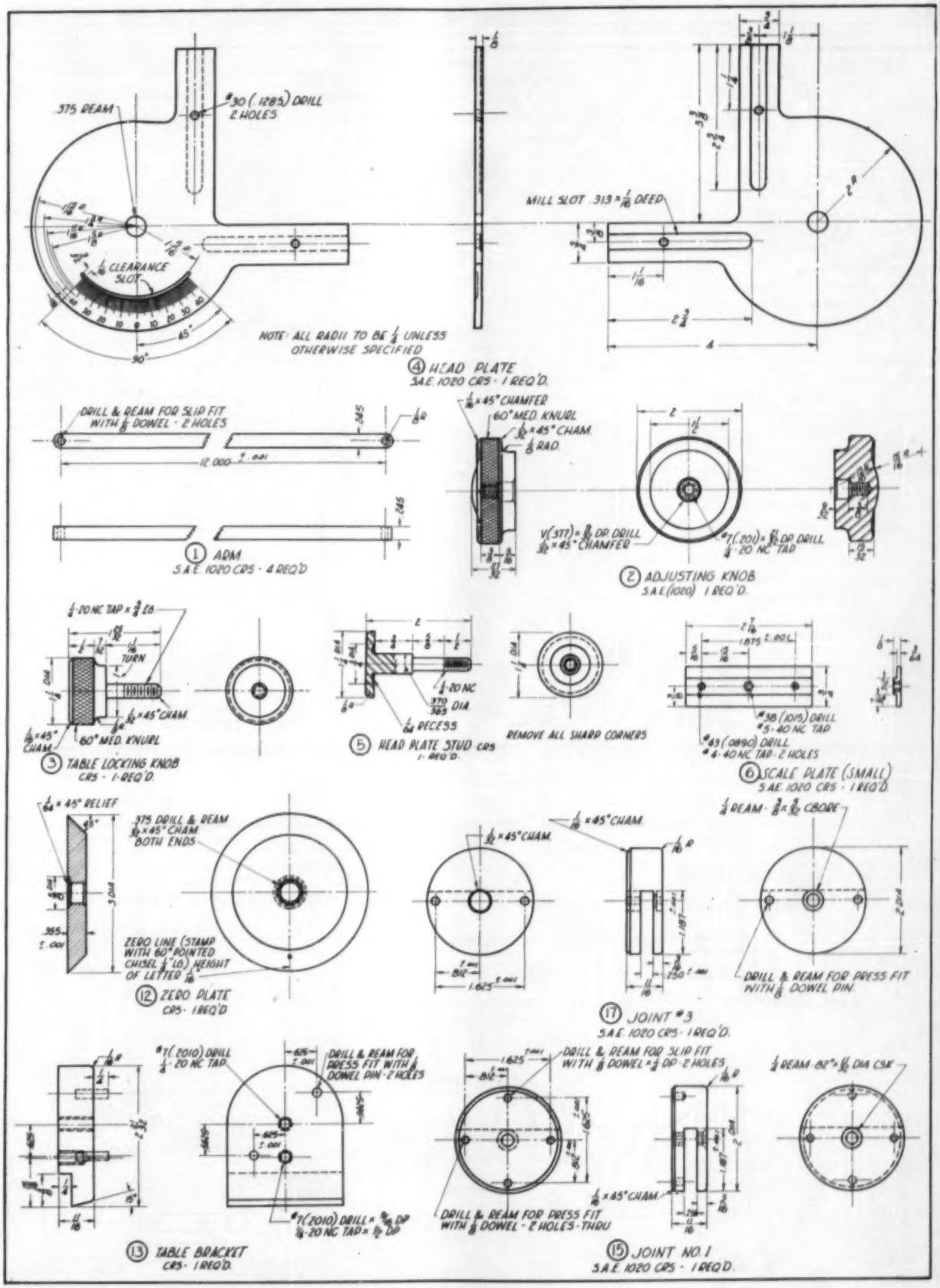
The pencil sander illustrated here is designed to help beginning drawing students sharpen their pencils correctly. It is designed for sharpening the drawing pencil for the chisel or wedge point only.

By clamping the abrasive paper tightly at the bottom of the block with the thumbscrew and pulling over the top and using thumbtacks to hold, one can get a tight fit. The pencil is stroked back and forth holding in the same position for best results.

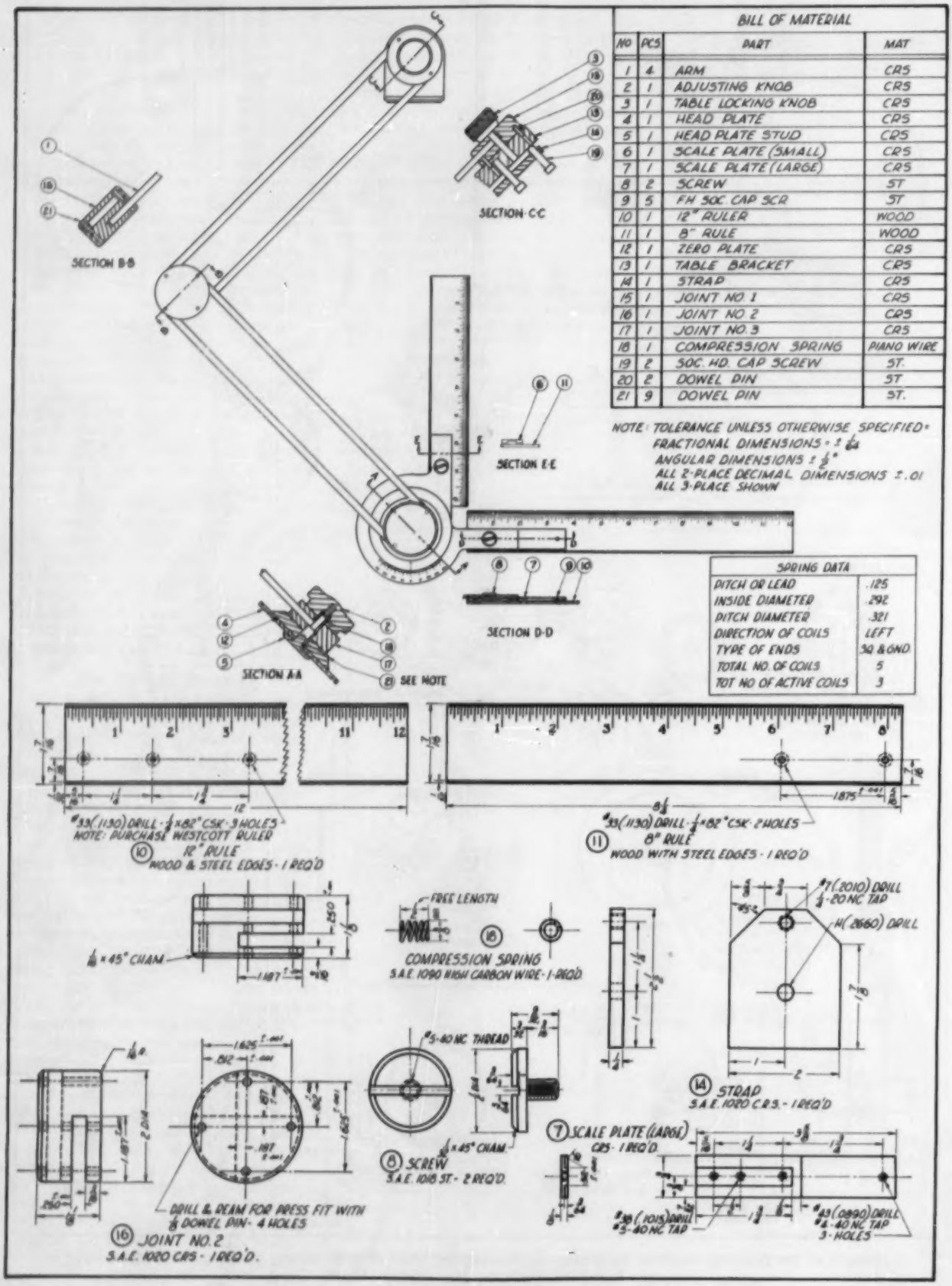
A cloth nearby to wipe the pencil off after sharpening helps the student from getting the lead from his pencil on his drawings.



Details of the chisel point sander


.375 REAM
#30 (.1285) DRILL 2 HOLES
1/8 CLEARANCE SLOT
45°
90°
NOTE: ALL RADII TO BE 1/4 UNLESS OTHERWISE SPECIFIED
MILL SLOT .313 × 1/16 DEEP
4
④ HEAD PLATE
SAE 1020 CRS - 1 REQ'D.
DRILL & REAM FOR SLIP FIT WITH 1/4 DOWEL - 2 HOLES
12.000 ± .001
① ARM
SAE 1020 CRS - 4 REQ'D
1/8 × 45° CHAMFER
60° MED. KNURL
1/16 × 45° CHAM.
1/8 RAD.
V(.377) = 3/8 DP DRILL
1/16 × 45° CHAMFER
7(.201) = 13/64 DP DRILL
1/4-20 NC TAP
② ADJUSTING KNOB
SAE (1020) 1 REQ'D.
1/4-20 NC TAP × 3/8 DP.
TURN
1/16 × 45° CHAM.
60° MED. KNURL
1/4 × 45° CHAM.
③ TABLE LOCKING KNOB
CRS - 1 REQ'D.
1/4-20 NC
.370/.365 DIA
1/64 RECESS
⑤ HEAD PLATE STUD CRS
1 REQ'D.
REMOVE ALL SHARP CORNERS
1.875 ± .001
#38 (.1015) DRILL
#5-40 NC TAP
#43 (.0890) DRILL
#4-40 NC TAP - 2 HOLES
⑥ SCALE PLATE (SMALL)
SAE 1020 CRS - 1 REQ'D.
1/64 × 45° RELIEF
.375 DRILL & REAM 1/32 × 45° CHAM BOTH ENDS
.385 ± .001
ZERO LINE (STAMP WITH 60° POINTED CHISEL 1/4 LG) HEIGHT OF LETTER 1/16
⑫ ZERO PLATE
CRS - 1 REQ'D
1/32 × 45° CHAM.
1.625 ± .001
1/16 × 45° CHAM.
.150 ± .001
⑰ JOINT #3
SAE 1020 CRS - 1 REQ'D.
1/4 REAM - 3/8 × 1/32 CBORE
DRILL & REAM FOR PRESS FIT WITH 1/4 DOWEL PIN.
7(.2010) DRILL
1/4-20 NC TAP
DRILL & REAM FOR PRESS FIT WITH 1/4 DOWEL PIN - 2 HOLES
7(.2010) DRILL = 9/16 DP
1/4-20 NC TAP = 1/2 DP
⑬ TABLE BRACKET
CRS - 1 REQ'D.
DRILL & REAM FOR SLIP FIT WITH 1/4 DOWEL × 1/2 DP - 2 HOLES
DRILL & REAM FOR PRESS FIT WITH 1/4 DOWEL - 2 HOLES - THRU
1/16 × 45° CHAM.
⑮ JOINT NO. 1
SAE 1020 CRS - 1 REQ'D.
1/4 REAM - 82° × 1/16 DIA CSK

Details of the drafting machine by Walter H. Harrington, head of engineering drafting, New Hampshire Technical Institute, Manchester, N. H.


SECTION B-B
SECTION C-C
SECTION E-E
SECTION D-D
SECTION A-A
SEE NOTE
BILL OF MATERIAL
NO | PCS | PART | MAT
1 | 4 | ARM | CRS
2 | 1 | ADJUSTING KNOB | CRS
3 | 1 | TABLE LOCKING KNOB | CRS
4 | 1 | HEAD PLATE | CRS
5 | 1 | HEAD PLATE STUD | CRS
6 | 1 | SCALE PLATE (SMALL) | CRS
7 | 1 | SCALE PLATE (LARGE) | CRS
8 | 2 | SCREW | ST
9 | 5 | FH SOC CAP SCR | ST
10 | 1 | 12" RULER | WOOD
11 | 1 | 8" RULE | WOOD
12 | 1 | ZERO PLATE | CRS
13 | 1 | TABLE BRACKET | CRS
14 | 1 | STRAP | CRS
15 | 1 | JOINT NO 1 | CRS
16 | 1 | JOINT NO 2 | CRS
17 | 1 | JOINT NO 3 | CRS
18 | 1 | COMPRESSION SPRING | PIANO WIRE
19 | 2 | SOC. HD. CAP SCREW | ST.
20 | 2 | DOWEL PIN | ST
21 | 9 | DOWEL PIN | ST.
NOTE: TOLERANCE UNLESS OTHERWISE SPECIFIED:
FRACTIONAL DIMENSIONS ± 1/64
ANGULAR DIMENSIONS ± 1/2°
ALL 2-PLACE DECIMAL DIMENSIONS ± .01
ALL 3-PLACE SHOWN
SPRING DATA
PITCH OR LEAD .125
INSIDE DIAMETER .292
PITCH DIAMETER .321
DIRECTION OF COILS LEFT
TYPE OF ENDS SQ & GND
TOTAL NO. OF COILS 5
TOT NO OF ACTIVE COILS 3
#33 (.1130) DRILL - 1/4 x 82° CSK - 3 HOLES
NOTE: PURCHASE WESTCOTT RULER
10 12" RULE
WOOD & STEEL EDGES - 1 REQ'D
#33 (.1130) DRILL - 1/4 x 82° CSK - 2 HOLES
11 8" RULE
WOOD WITH STEEL EDGES - 1 REQ'D
1/8 x 45° CHAM
FREE LENGTH
18 COMPRESSION SPRING
S.A.E. 1090 HIGH CARBON WIRE - 1 REQ'D
#7 (.2010) DRILL
5/16-20 NC TAP
H (.2660) DRILL
14 STRAP
S.A.E. 1020 C.R.S. - 1 REQ'D
#5-40 NC THREAD
1/8 x 45° CHAM
8 SCREW
S.A.E. 1018 ST - 2 REQ'D.
7 SCALE PLATE (LARGE)
CRS - 1 REQ'D.
#30 (.1015) DRILL
#5-40 NC TAP
#43 (.0890) DRILL
#4-40 NC TAP
3 HOLES
DRILL & REAM FOR PRESS FIT WITH
1/8 DOWEL PIN - 4 HOLES
16 JOINT NO. 2
S.A.E. 1020 CRS - 1 REQ'D.

Further details of the drafting machine by Walter H. Harrington

DYNAMITE CAP TIE RACK

OWEN G. PARSONS
Instructor of Industrial Arts
Perth Central School
Amsterdam, N. Y.

This practical tie rack receives its name from the empty dynamite caps that form the holders for the ties. These caps were obtained through the surplus system operated for the benefit of the public schools. They were sold by the pound (approx. 250) for a few cents.

If no dynamite caps are available any ¼-in. diameter material could be substituted such as birch dowels, plastic rod or brass or copper rod.

The project is being used at the present time in ninth grade general shop.

BILL OF MATERIALS

No. of Pcs.	*Part*	*Material*	*Size*
1	Back	Cherry	¾ x 2⅛ x 3 in.
1	Bar	Cherry	¾ x 1 x 12 in.
12	Holders	D. caps	¼ x ⅛ x 1⅜₁₆ in.
1	Screw, round head 1 x 7 in.		
1	Button, birch ⅜ in.		

General Construction

1. Lay out back and bar as shown in drawing.
2. Cut out back and bar and sand smooth.
3. Round all corners slightly.
4. Lay out location of all holes.
5. Drill all holes with machine wood bits.
6. Assemble back and bar with round head screw, glue in birch button.
7. Clean dynamite caps with fine steel wool and apply clear lacquer.
8. In final assembly, place small drop of Duco cement to dynamite cap and tap into place.

The clean cut lines and the contrast of the copper against the darker cherry produces a really striking project.

THE THOUSANDTH STUDENT

"Miss 1000" is the title given Miss Janice Jenquin, Seymour, Wis., a junior coed in the home-economics division of Stout State College, Menomonie, Wis., when she was the one thousandth student to register in the record-breaking enrollment of the college this fall. Congratulating her is Dr. Verne C. Fryklund, president of Stout. The college has enrolled 1042 students.

Dr. Fryklund and Miss Janice Jenquin

RECLAIMING AN OLD RADIO CABINET

RICHARD R. KYL
Des Moines, Iowa

Even before TV, people were asking, "What can be made from an old radio console?" The question persists.

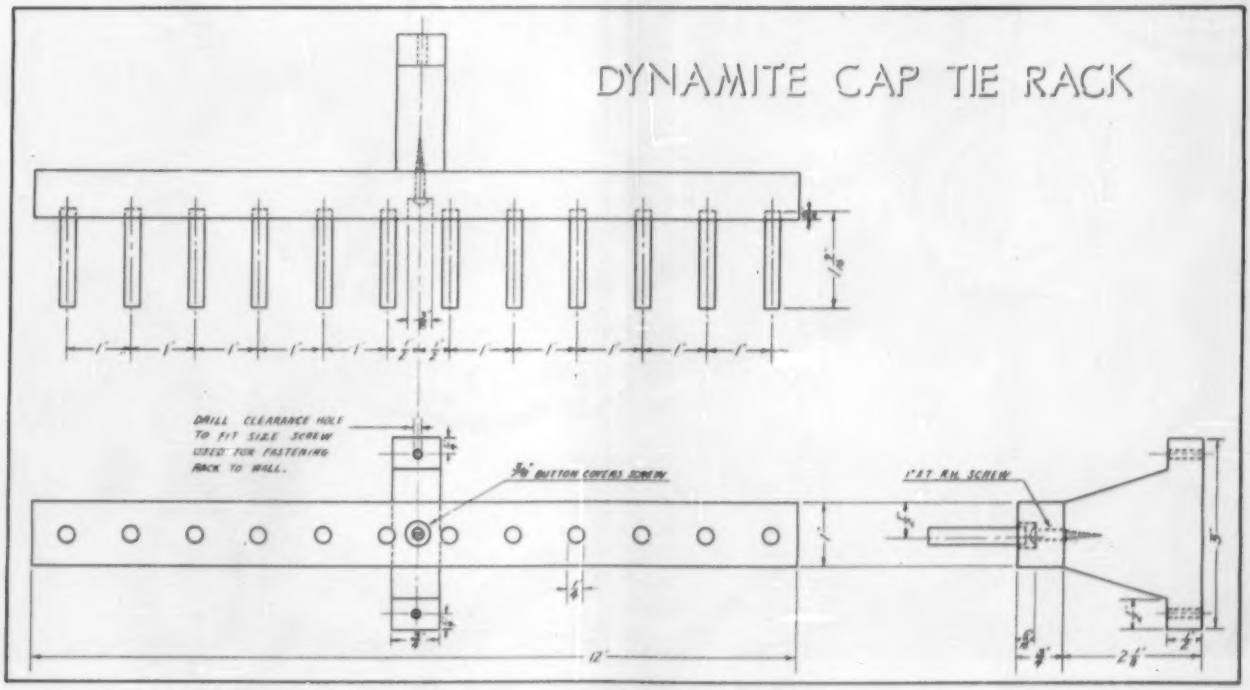
Thousands of old radios now gather dust in attics or take up useful space elsewhere. The owners would be glad to convert them if the idea were presented or they would be glad to give them to someone who could do so, yet they are reluctant to throw them away.

The sequence pictures in this article show (1) a radio cabinet of suitable soundness and design for remodeling, (2) sawing out a front panel assemblage, (3) parts in various stages of fabrication with the case furred out to receive them, (4) the finished conversion as a very satisfactory child's book or toy cabinet.

This job features reclaimed scrap. The builder had enough walnut rippings for doors and shelf facing, odds of ¼-in. sap gumwood ply, an ample length of continuous hinge, some shelf supports and friction door catches plus a pair of door pulls. The things you have or buy may be quite different yet even more satisfactory.

Here is an opportunity for the boy with limited means to come out of the school shop or his own shop with a nice piece. It has, in spite of the purist's frowns, a lot of educational possibility.

Some things to consider in the processes


DYNAMITE CAP TIE RACK
DRILL CLEARANCE HOLE TO FIT SIZE SCREW USED FOR FASTENING RACK TO WALL.
⅜" BUTTON COVERS SCREW
1" AT RH. SCREW
12"

Details of the dynamite cap tie rack

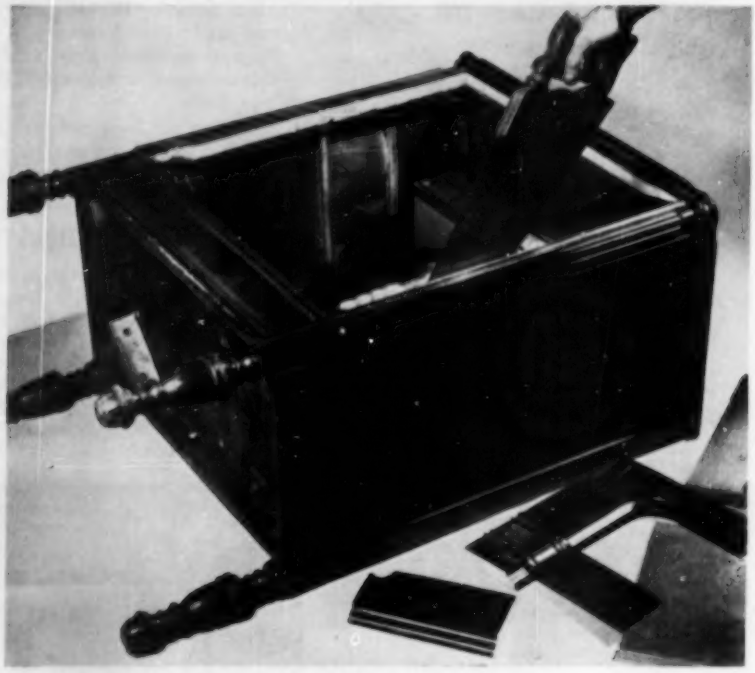


Fig. 1. The radio cabinet which is to be transformed. Fig. 2. Sawing out the front panel

Fig. 3. The inside ready for the new changes. Fig. 4. The finished conversion

— Photos by Stanley Studios, Des Moines, Iowa

are: make liners narrow enough to permit letting in a back of ¼-in. plywood, let floor board act as doorstop, avoid any heavy pounding which might disturb the original case. Fasten units in with screws for same reason. Round exposed edges of liners if they occur, to blend into the face as a decorative bead.

Finally a bit of sanding, some stain, and a coat or two of finish will produce a worth-while piece.

Three greenhouses and a garden are maintained by one steel company in its drive against air pollution. The flowers, shrubs, and vegetables are studied to ascertain if they are being affected by air pollution. — *Steel Facts.*

A synthetic rubber that resists attack by ozone and most chemicals has just emerged from laboratories of the chemical and oil industries. Made with petroleum derivatives, its suggested applications include floor coverings, footwear, white sidewall tires, wire insulation, conveyor belts, adhesives and inks. — *Petroleum Newsnotes.*

Inexpensive Teaching Materials For Industrial Education

CHRIS H. GRONEMAN
Head, Industrial Education Department
School of Engineering
The Agricultural and Mechanical College of Texas
College Station, Texas

Metals — Film Materials

(Continued from page 34A of the November, 1955, issue)

South Bend Lathe Works
South Bend 22, Indiana

The Lathe, Film I, Color, 16mm.
Plain Turning, Film II, color, 16mm.
Grinding Cutter Bits, Film III, 16mm. color
Scale Models, for three-dimensional shop Planning, loan basis
Color Slides, 35mm.

Speakman Company
Sales Manager
Wilmington 99, Delaware

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Starrett Company, The L. S.
Athol, Massachusetts

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Manager
Motion Picture and Visual Aids Section
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Pittsburgh 30, Pennsylvania

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Utica, New York

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Pliers: Their Use and Care, 16mm. black and white, sound
Manufacturing Jet Blades, 16mm. black and white, suitable for TV
5000 Years of Forging, 16mm. black and white, suitable for TV

Wolverine Tube Division
Calumet and Hecla Consolidated Copper Company
1850 Guardian Building
Detroit 26, Michigan

Quality Control — From Ore to Finished Product, 16mm. sound color

Wood Mfg. Company, Inc., John
Sales Promotion Manager
Conshohocken, Pennsylvania

Must It Rust, 16mm. sound

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930 West Central Avenue
Toledo 6, Ohio

Boice-Crane Friction-Matic Wet Tool Grinder
Boice-Crane Power Tools

Cope Plastics, D. W.
11640 Bellefontaine Road
St. Louis 15, Missouri

Catalog of Plastic Carving Supplies
How-To-Make Plastic Carvings

Catalin Corporation of America
One Park Avenue
New York 16, New York

Catalin Cast Resins for Photoelastic Analysis of Stress
Catalin Resin Glues
Catalin Medium Impact Styrene Molding Powder

Dixon, Incorporated, William
32-42 East Kinney Street
Newark 1, New Jersey

Designs and Methods in Plastics, 40¢

Du Pont de Nemours and Company, E. I.
Wilmington, Delaware

The Story of Cellulose
Nylon: Development, Physical Properties, and Present Status
Memorandum on Nylon Plastic
"Lucite" Acrylic Resin
Neoprene
"Alathon" Polyethylene Resin — Many Purpose Plastic
Memorandum on "Teflon" Tetrafluoroethylene Resin

Gilbert and Miller, Inc.
404 Fourth Avenue
New York 16, New York

Wholesale Price List, 1954, Plastic Accessories

House of Plastics
8648 Linwood Avenue
Detroit, Michigan

Fabricating Manual and Catalog, 25¢

Sherman Company, Irvin
5741 McPherson Avenue
St. Louis 12, Missouri
or
Plastic Parts and Sales
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St. Louis 10, Missouri

16-page price list on over 4000 items of plastics, dyes, adhesives, finishing compounds, etc.
Catalog showing one of America's largest selections of Jewelry Findings
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Synthane Metal Foil Clad Laminated Plastics
Silent Stabilized Gear Material
Synthane Laminated Plastics for the Textile Industry
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Insulation Resistance of Thermosetting Laminates
Dielectric Fatigue of Thermoset Laminates
Industrial Applications of Thermosetting Laminated Plastic Tubing

How to Machine Laminated Plastics of the Asbestos, Glass and Graphite Grades
Methods of Machining Laminated Phenolic Plastics
Laminated Thermosetting Plastics
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Des Moines, Iowa

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Make Your Own Decorator Lamp Shades

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Van Horn Plastics
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Des Moines, Iowa

Kissing Angel
Snowy the Snowman
Snow Shapes

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New York 17, New York

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Molding Techniques, 16mm.

Monsanto Chemical Company
Plastics Division
Springfield 2, Massachusetts

Shell Molding, 16mm. sound

Rohm and Haas Company
Washington Square
Philadelphia 5, Pennsylvania

Eyes of Flight, 16mm. color and sound

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New York 20, New York

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American Technical Society
848 East Fifty-Eighth Street
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237 N. Monroe Street
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The Story of Cellophane
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The Story of Farm Chemicals
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The Story of Research
The Story of Employment Opportunities

General Motors
Educational Relations Section
Department of Public Relations
Detroit 2, Michigan

No Formula — What Then?
American Battle for Abundance
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Can I Be a Craftsman?
Can I Be an Engineer?
Man to Man on the Job
The College Graduate and General Motors
Precision a Measure of Progress . . .

Elbar Products
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Brooklyn 29, New York

Elbar Internal Carving Drills for Plastics

Gorton Machine Company, George
Racine, Wisconsin

Pantography

Macmillan Company, The
60 Fifth Avenue
New York 11, New York

Macmillan Technical and Business Books

McKnight and McKnight Publishing Company
Market and Center Streets
Bloomington, Illinois

Industrial Books Catalog

McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York

Vocational Books Order Form
Industrial Arts Folder
Agriculture (Rural Activities) Folder
Technical Education News
Text-Films News
Books for Directors of Training in Business and Industry
The Engineering Technician

Metal Lath Manufacturers Association
Engineers Building
Cleveland 14, Ohio

Metal Lath and Plaster
Reinforcing Plaster with Expanded Metal Lath
Technical Bulletin No. 10, Casing Beads, Base Screed, Concealed Picture Mold

National Association of Manufacturers
2 East 48th Street
New York 17, New York

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Education-Industry Relationships — A Connecticut Study With National Implications
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This We Believe About Education
Our Public Schools — And Their Financial Support
Our Colleges and Universities — And Their Financial Support

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419 Fourth Avenue
New York 16, New York

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Colorado Tale
Youth Employment and Child Labor Laws
Child Labor Facts and Law Analysis
Desirable Standards for Youth Employment
Bibliographies: Child Labor and Youth Employment; Early School Leavers; Migratory Farm Labor

National Safety Council
425 North Michigan Avenue
Chicago 11, Illinois

Safety Education in the School Shop, 69¢
Shop Safety

Norton Company
Worcester 6, Mass.

Abrasives Their History and Development From the Far Corners of the Earth

Parent Metal Products
Philadelphia, Pennsylvania

Industrial Arts and Vocational Shop Equipment of Steel

Prentice-Hall, Inc.
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New York 11, New York

Prentice-Hall Textbook Catalog

Superintendent of Documents
U. S. Government Printing Office
Washington 25, D. C.

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(Continued on page 16A)

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No. 2450 — 14" Tilting Arbor Saw — Capacity: 5" with 14" blade, 3½" at 45°; with 8" dado, 2". Speed: 3450 rpm. Table: 38¾" deep x 48" wide with extension. With 14" combination blade, extension table, miter gauge, splitter, guard, including 5 hp 220/440 volt 60 cycle 3-phase motor, with push button station. $946.50.

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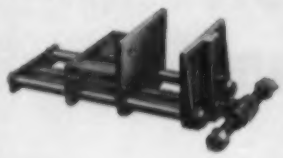

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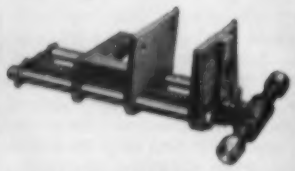

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(Continued from page 344)

and Industrial Instruction, 1953, Catalog No. FS 5.4:366
Guide to Occupational Choice and Training, 60¢ Catalog No. FS 5.123:236
Occupations, Basic Course for Counselors, 60¢ Catalog No. FS 5.123:247
Vocational Education, 35¢ Catalog No. FS 5.123:1
Operation of Local Program of Trade and Industrial Education, 50¢ Catalog No. FS 5.123:250
Vocational Education Act of 1946, 5¢ Catalog No. 79-2 Pub. Law 586

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Division Kearney & Trecker Corporation
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General Motors Corp.
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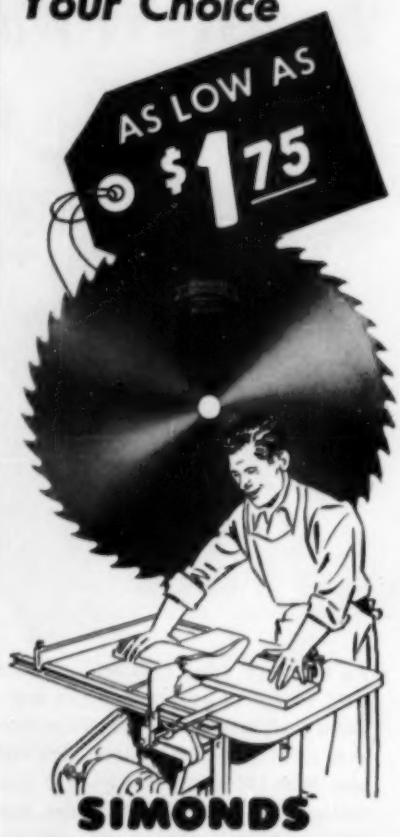
(Continued on page 18A)

Your Choice



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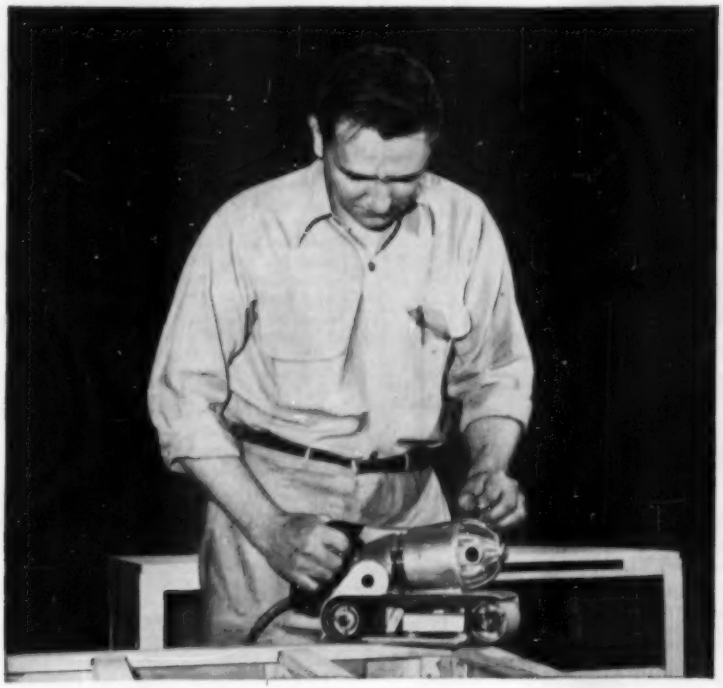
Students are more interested, quicker to learn when you teach them with the SKIL tools they'll use professionally!



Put a professional SKIL tool in a young man's hands and immediately you increase his enthusiasm. Even a rank amateur recognizes a SKIL tool for an outstanding craftsman's product. He knows that he's being taught the most modern methods. He's truly being equipped for his future job.

The young man pictured at the left is using a SKIL Sander. He's quick to discover that this powerful tool is built to perform and built to take it. You'll see a quick improvement in his work. And, tool maintenance will be a lot lower, too.

SKIL Belt Sanders (Left)

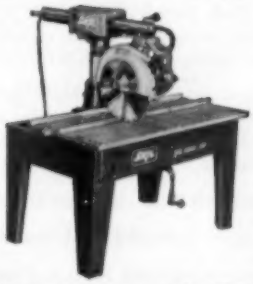
These sanders produce the finest ripple-free finishes you could ask. Ten times faster than by hand, long-lasting, powerful and easy-to-maintain. Perfect for instruction, for school maintenance, desk sanding and refinishing blackboards.

Model 448 . . . Belt Width 3"
Model 449 (with vacuum dust collector) . . . Belt Width 3"

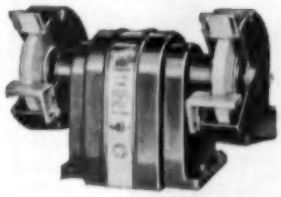
Other SKIL Belt Sanders up to 4½" width.

SKIL 3" Electric Plane Answers All Needs for both accurate Edge or Surface Planing

Cog-belt drive requires no lubrication—important where *many* people use a tool and depend on others for maintenance. Sharpening is simple and quick with an inexpensive SKIL attachment. Weighs a third less than comparable planes, sturdy and dependable.



SKIL Radial Saws *are safest!* Controls are in *front*. Retractable arm clears work area. Sturdy blade guard adjusts easily. Controls recessed to prevent accidental starting. 2, 3, and 5 h.p., with 14" and 16" blades. Valuable in building trade classes; a "must" for the maintenance shop.



New SKIL 6" Bench Grinder—*Model 246.* Indispensable for training and maintenance of cutting tools. Lowest priced grinder with fully enclosed wheels, exhaust chutes, adjustable tool rests—all important safety features. Other larger models available.

The Wide Range of SKIL Drills—26 Models —Assures the Exact Power and Capacity for all School Needs.

Capacities up to 1" in steel, 2" in hardwood. Motors are reserve-powered, ideally balanced for easier use by the student or maintenance man. Optional speeds. Complete line of accessories, including drill stand to make low-cost, accurate drill press.

SKIL PORTABLE TOOLS

Made only by SKIL Corporation
formerly SKILSAW, Inc.
5033 Elston Avenue, Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario
Factory Branches in ALL Leading Cities

FREE TRIAL! FREE DEMONSTRATION!

Ask your SKIL Distributor to let you see and try SKIL tools!

SKIL Corporation, Dept. IA-125
5033 Elston Avenue, Chicago 30, Illinois

☐ I would like a demonstration and free trial.
☐ Please send literature on SKIL tools.

Name_____

Street_____

City_____ Zone____ State_____

TEACHING MATERIALS

(Continued from page 16A)

Exhibitors in Greater New York and on Long Island should write to:

General Motors Corp.
Department of Public Relations Film Section
1775 Broadway
New York 19, New York

All other states, including that part of New York State not mentioned above, are served by:

General Motors Corp.
Department of Public Relations Film Section
General Motors Building
Detroit 2, Michigan

The Easier Way, sound motion picture, 16mm.
Strange Interview, sound motion picture, 16mm.
A Professional Portrait, sound motion picture, 16mm.
Experiment, sound motion picture, 16mm.
The Price of Freedom, sound motion picture, 16mm.
How Not to Conduct a Meeting, sound motion picture, 16mm.
Films on Economics, sound motion picture, 16mm.
Selling America Today, sound motion picture, 16mm.
The Questing Mind, sound motion picture in color, 16mm.
Doctor in Industry, sound motion picture, 16mm.

Insulation Board Institute
111 West Washington Street
Chicago 2, Illinois

38 live ideas for the metal and general shop instructor
BRAND NEW!
Contemporary sheet Metal Projects for beginning metal workers
Six spanking new projects that teach sheet and perforated metal on the Bender, Roller and Brake.
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Suggestions in Wrought Iron for the Modern Home
Eight excellent examples of functional design that combine wood with wrought iron and expanded metal.
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Twelve timely applications of the standard operations essential to metalworking. For basic teaching on the basic machines.
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Order now. Twelve plastic projects that will help you plan for the new stretch, vacuum and blow forming press to be announced.
PLASTICS
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di-acro
PRECISION METALWORKING MACHINES
Di-Acro Plans in single sets available to instructors free of charge. In classroom lots—25c each.
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Contemporary Sheet Metal Projects
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Projects in General Metalworking
Plastics for the School Shop
See Di-Acro exhibit, booth No. 29 and 30, AVA Show, Atlantic City, N. J., Dec. 5-9, 1955
O'NEIL-IRWIN MFG. CO., 351 Eighth Ave., Lake City, Minn.
Name
School
Address

The Professor Was A Salesman, 16mm. sound motion color
Climate as You Like It, 16mm. sound color

Kansas, The University of
Lawrence, Kansas

Announcement of Audio-Visual Aids Motion Pictures

Library Films Inc.
25 West 45th. Street
New York 36, New York

Educational Film Releases

Modern Talking Picture Service Film Libraries are located at:

Atlanta 3, Georgia – 247 Spring St., S.W.
Boston 16, Mass. – 235 Stuart Street
Buffalo 2, N. Y. – 122 W. Chippewa St.
Cedar Rapids, Iowa – 720 Third Ave., S.E.
Charlotte 6, N. C. – 501 No. College St.
Chicago 11, Illinois – 140 East Ontario St.
Cincinnati 2, Ohio – 9 Garfield Place
Cleveland 14, Ohio – 1008 Superior Ave.
Dallas 1, Texas – 413A No. Ervay Street
Denver 9, Colorado – 583 South York St.
Detroit 1, Mich. – 4754 Woodward Ave.
Harrisburg, Pa. – 928 North Third Street
Houston 2, Texas – 2610 Fannin Street
Indianapolis 4, Ind. – 102 E. Vermont St.
Kansas City 5, Missouri – 1321 Main St.
Los Angeles 57, Calif. – 2400 W. 7th St.
Memphis 4, Tenn. – 1754 Madison Ave.
Milwaukee 3, Wisconsin – 840 No. Plankinton Avenue
Minneapolis 2, Minn. – 1112 Nicollet Ave.
New Orleans 12, La. – 815 Poydras St.
New York 20, New York – 30 Rockefeller Plaza Concourse Shop #51
Omaha 2, Nebraska – 1410 Howard St.
Philadelphia 7, Pa. – 243 So. Broad St.
Pittsburgh 22, Pennsylvania – 339 Blvd. of the Allies
St. Louis 5, Mo. – 612 No. Skinker Blvd.
Oakland 9, California – 6117 Grove Street (San Francisco Area)
Seattle 5, Wash. – 5514 University Way
Washington 5, D. C. – 903 15th St., N.W.

Decision for Chemistry, 35 minutes, 16mm.

Mogull's Motion Picture Film Library
112 48th. Street
New York, New York

Catalog of 16mm. silent motion picture film library 16mm. sound-on-film catalog

National Association of Manufacturers
2 East 48th. Street
New York 17, New York

Good Place to Work, 16mm. black and white, $1.50
Your Money is What you Make It, color, 16mm., $1.50
Opportunities Unlimited, black and white, 16mm. $1.50
The Quarterback, black and white, 16mm. $1.50
The Price of Freedom, black and white, 16mm. $1.50
Joe Turner, American, black and white, 16mm. $1.50
Industry on Parade, black and white, 16mm. $1.50
Industrial Research — Key to Progress, black and white, 16mm. $1.50
Tomorrow's America, 16mm. $1.50

National Association of Plumbing Contractors
1016 20th. Street, N. W.
Washington 6, D. C.

Plumbing, 16mm. black and white sound
Motion Picture Films About the Plumbing and Heating Industry (Catalog and Supplements Including Slide Films, Visual Aids, and Demonstrations)

Society for Visual Education Inc.
1345 Diversey Parkway
Chicago 14, Illinois

Educational Filmstrips, slidesets, and equipment, catalogue

U. S. Department of Health, Education, and Welfare
Public Health Service
Washington 25, D. C.

USPHS Motion Pictures, a Selected List

United States Government Printing Office
Division of Public Documents
Washington 25, D. C.

Directory of 2660 16mm. film libraries, Catalog No. FS 5.3: 953/7, 50¢
Movie Projectors in Public High Schools 1950, 15¢ Catalog No. FS 5.17: 109
3,434 U. S. Government Films (Motion Pictures, Filmstrips, sets of Slides, available for public use in United States), 1951, 70¢ Catalog No. FS 5.3: 951/21

TRANSPORTATION — BULLETINS AND BOOKLETS

Accident Prevention Department
Association of Casualty and Surety Companies
60 John Street
New York 38, New York

Camp Safety Digest, 30¢
Rescue and First Aid Digest, 30¢
Traffic Safety Digest, 45¢
CV-1 Truck and Bus Drivers Rule Booklet, $6.50 per 100
CV-3 Commercial Vehicle Drivers Guide Book, $4.90 per 100
CS-10 Agents of Safety
CS-9 How to Attack the Traffic Accident Problem in Your Community (Temporarily out of print)
MV-1 Motor Vehicle Inspection Manual
State-Wide Periodic Motor Vehicle Inspection — State-Owned and Operated System
State-Wide Periodic Motor Vehicle Inspection — Private Stations Appointed by State
Home Instructor's Manual for Practice Driving, ED-19
Common Sense Pays Off, $3.75 per 100, ED-22
Driver Education in the Secondary School, ED-24 (Temporarily out of print)
Man-to-Man Agreements and Club Cards, $1.25 per 100
Dad-to-Daughter Agreements and Club Cards, $1.25 per 100
What Makes a Champion?, $9.85 per 1000
National Safe Drivers Test, ET-1
General Safety Education Test for Junior High School Students, ET-5
General First Aid Test for Senior High School Students, ET-7
National Bicycle Test, ET-11
Driving Knowledge Quiz, $2.50 per 100, ET-30
Score Sheet and Interpretation of Test Results, $1.00 per 100, B-1
Calibrated Discs, $1.00 per 100, B-2
Score Sheet for Drivers Skill Tests, $1.50 per 100, C-1
Driver Checklist, 75¢ per 100, C-4
Correcting Traffic Difficulties, T-22
Getting Results Through Traffic Engineering — Single Sheet Mailed Periodically upon request
Jacksonville, Fla., Recommendations for Traffic Administration and Control

Aircraft Industries Association of America, Inc.
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15th. & H. Streets, N. W.
Washington 5, D. C.

Aviation Activities
A Day in the Life of A Jet Test Pilot, 50¢
The Story of the Aircraft Plant, 50¢
U. S. Aviation Today
Look to the Sky, 50¢
Jets, 50¢
Helicopters, 50¢
Air Power in an Age of Peril,
Fifty Years of Aviation Progress

Allen Electric and Equipment Company
2101 North Pitcher Street
Kalamazoo, Michigan

Allen Automotive Servicing, Student's Textbook, $2.40, Ma

All-State Welding Alloys Company, Inc.
249-55 Ferris Avenue
Box 350
White Plains, New York

Do's and Don'ts in Use of Silver Brazing Alloys, BO-F
Brazing Manual, MA-F
Buyer's Guide, CA-F
How to Use and Apply All-State Alloys and Fluxes Contained in DOC Alloys Kit, BO-F
How to Use and Apply All-State Alloys and Fluxes for Welding, Brazing, Soldering and Cutting: Steel Aluminum Copper, BO-F

American Automobile Association
1712 G. Street, N. W.
Washington 6, D. C.

Learning to Drive Cars with Automatic Transmissions, MA- 50¢
Practice Driving Guides (automatic transmission), $2.25 pkg.
Practice Driving Guides (gear shift), $2.25 pkg.
Project Workbook for Sportsmanlike Driving, Ma - 76¢

(Continued on next page)

NEW SPARTAN MODEL 24
A DI-ACRO BOX AND PAN BRAKE
with undercut box fingers and 1" material clearance
for just **295.00** delivered

The Spartan's new design and rugged construction was planned specifically for school shops. Hardened Box Fingers are undercut to allow the forming of chassis and boxes as deep as 2½" with lipped edges as large as ½" across. Material clearance of 1" between the Box Fingers and the Bottom Plate allows for easy insertion and removal of material. The Spartan bends 16 gauge mild steel up to 135° in one operation. It can also be used as a radius former and bar folder. An adjustable back gauge and a simplified stop control are standard equipment, *available in 24" width only.*

SPARTAN MODEL DI-ACRO ROLLER
Built exclusively for school shops in five widths, 12" to 36", all with 2" machined rolls. Form smooth cylinders with radii of 1" and larger in sheet-metals up to 16 gauge. Heavy welded steel and cast construction. Delivered for as low as $105.00.

DI-ACRO SHEAR
An industrial tool available to schools in 6", 9", 12" and 24" widths. Capacity 16 gauge steel.

DI-ACRO BENDER
Available in five sizes that form bar stock, flats and tubing in a minimum of change-over time.

pronounced die-ack-ro
di-acro PRECISION METALWORKING MACHINES

Please tell me about
☐ SPARTAN BRAKE ☐ SPARTAN ROLLER
☐ DI-ACRO SHEAR ☐ DI-ACRO BENDER

See Di-Acro Exhibit Booth Nos. 29 and 30, AVA Show, Atlantic City, N. J., Dec. 5–9, 1955

O'NEIL-IRWIN MFG. CO., 355 Eighth Ave., Lake City, Minn.

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School_____
Address_____

TEACHING MATERIALS

(Continued from previous page)

Road Test in Traffic Instruction Sheet, 27¢ pad
Sportsmanlike Driving, Ma- $2.80
Sportsmanlike Driving Tests, 1A-5A, 1B-5B, 35¢ pkg.
Teachers Manual for Sportsmanlike Driving, MA- 55¢

American Brakeblok Divn.
4600 Merritt Avenue
Detroit 9, Michigan

Brakes and How They Work, Ma-F
Ready Reference Brake Service Guide, Ma-F

American Motors Corp.
Nash Motors Divn.
14250 Plymouth Rd.
Detroit, Michigan

Nash Service Manual, Ma-F

American Motors Corp.
Hudson Motor Divn.
Detroit 15, Michigan

Hudson Service Manual

American Welding Society, Inc.
33 West 39th. Street
New York 18, New York

Inspection Handbook for Manual MetalArc Welding, $2.00
Minimum Requirements Code for Instruction of Welding Operators: Arc Welding of Steel, 75¢
Minimum Requirements for Instruction of Welding Operators: Oxy-Acetylene Welding of Steel Aircraft, 75¢
Safety in Electric and Gas Welding and Cutting Operations — American Standard, 50¢
Safe Practices for Welding and Cutting Containers That Have Held Combustibles, 50¢
Standard Welding Symbols, $1.00
Standard Welding Terms & Their Definitions, $1.00

Automotive Electric Association
16223 Meyers Road
Detroit 35, Michigan

AEA Tech. Training Manual, Vol. I, Auto, Elec. Systems, 65¢
AEA Tune-Up Manual, $1.00
AEA Electrical Specifications Handbook, $1.00
AEA Tune-Up Charts annual, $3.00
1954 Electrical Parts Catalogue, 16½¢
1954 Fuels Systems Catalogue, 15¢

American Liquid Gas Corp.
1109 Santa Fe Ave.
Los Angeles 21, California

Sales Catalogue
Service Manual: carburetion
Miscellaneous literature

Association of American Railroads
School and College Service
Transportation Building
Washington 6, D. C.

Railroads at work
American Railroads: Their Growth and Development
Quiz, Jr.
The Railroad Story
Quiz on Railroads And Railroading
The Day of Two Noons
A Chronology of American Railroads — Including Mileage by States and By Years
The Human Side of Railroading
Railroads Deliver the Goods
We Learn About Trains
Map List
College Courses in Railroad Subjects
Train and Engine Books For Children
List of Principal Railroads in the United States With Home Address of Each
Railway Literature

Atchison, Topeka and Santa Fe
Railway Company
Public Relations Department
Chicago 4, Illinois

The Railroad

Automobile Manufacturers Association
New Center Building
Detroit 2, Michigan

A Chronicle of the Automotive Industry in America
What Do You Know About Trucks
Automobile Facts
1954 Edition Motor Truck Facts
Automobile Facts and Figures
The Work Cars Do
A Bibliography of Automotive Literature
What It Takes to Make Your Car
Horses to Horsepower
A Car Traveling People
Aids for Teachers of Automobile Mechanics available from Automobile and Related Industries
Directory of Service Training Schools Maintained by Automotive Industry, available to Auto Mechanics Teachers
Recommended Procedures for Obtaining Automobile parts and assemblies for instructional purposes from motor vehicle manufacturers

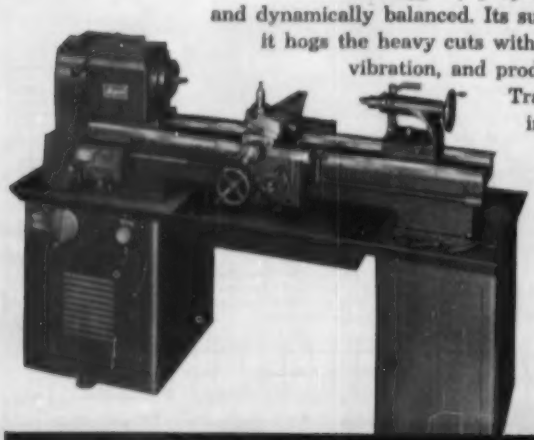
Barrett Equipment Company
21st. and Cass
St. Louis 6, Missouri

Barrett Brake School Manual, available at a reduced price for instructional purposes. Details will be furnished on request

(Continued on page 22A)

from its big ball-bearing spindle . . . .
. . . . to the precision carriage . . . .
along its rugged, accurate bed . . . .
to the tailstock . .
. . . . and down to the variable speed drive . . .
and its solid, strong, convenient cabinet

. . . . the No. 6560 Logan 14" Lathe is ruggedly proportioned, precision built and dynamically balanced. Its superiority is evident as it hogs the heavy cuts with almost no perceptible vibration, and produces precision results. Trains the student on an industrial lathe. At your Logan dealer's. Write for Bulletin 14-L.



SPECIFICATIONS AND FEATURES

14⅛" swing over bed
9" swing over saddle
1⅛" spindle hole
1" collet capacity
40" between centers
Variable Speed Drive
Ball Bearing Spindle
38 to 1200 rpm

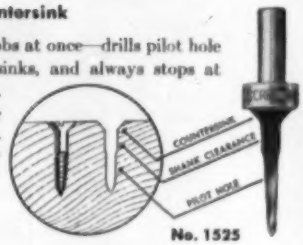
LOGAN ENGINEERING CO.
4901 WEST LAWRENCE AVENUE • CHICAGO 30, ILLINOIS

STANLEY SHOP TALK

NEW! SCREW-MATES

Stanley No. 1525 Drill-Countersink

This new Screw-Mate does 4 jobs at once—drills pilot hole and shank clearance, countersinks, and always stops at exactly the right screw depth. Fits chuck of hand drill, power drill or drill press. 24 sizes—from ½" x No. 5 through 2½" x No. 12. ¼" shank size.



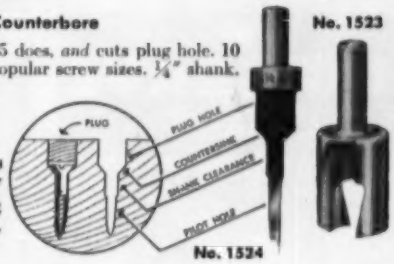
No. 1525

Stanley No. 1524 Counterbore — No. 1523

Does all that No. 1525 does, *and* cuts plug hole. 10 sizes to match most popular screw sizes. ¼" shank.

Stanley No. 1523 Plug Cutter

Cuts proper size plugs for counterbored screw holes. 5 sizes cut ¼", ⅜", 7/16", ½" and ⅝" diameter plugs, ¼" shank.



No. 1524

NAIL HAMMER

No. 52

Stanley No. 52 is a 13 oz. nail hammer with curved claws, triple wedged head that can't come off and a straight grained, select white hickory handle. Other sizes and ripping claw models available as follows:

Curved Claws		Ripping Claws	
No. 53	7 oz.	No. 51½A	16 oz.
No. 52½	10 oz.	No. 51A	20 oz.
No. 51½	16 oz.		
No. 51	20 oz.		

"YANKEE"® VISES

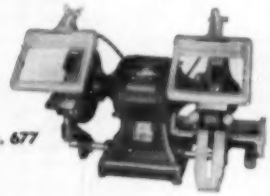
No. 993

The "Yankee" No. 993— Use on work bench, drill press or other machines, 2¾" jaws open to 3⅛". Other models in 1½", 2" and 4" jaw sizes. All have grooved "V" block for holding rounds, etc. Swivel bases for all "Yankee" Vises are available.

No. 3993

The "Yankee" No. 3993— 2¾" jaws. Here's a practical angle vise for your machine shop. For quick set ups of work to be machined accurately at an angle. Jaws open to full capacity (3") at any angle. Grooved "V" block for holding rounds, etc., supplied with each vise; also made with detachable swivel base.

BENCH GRINDER


No. 677

Especially suited for shop sharpening use. Patented attachment for grinding chisels and plane irons up to 2⅝" wide. Equipped with "Flud-Lite" Eye Shields that cannot be moved to non-guarding position.

3/4 HP ROUTER

A versatile woodworking tool. Shaped edges, inlays, templet cuts. Many woodworking joints are fascinating and easy with the router. 20,000 rpm.

No. R8A

ROUTER MANUAL

Order "The Router—What It Is and Does." 38 pages of information with more than 100 illustrations. Only 35¢ to schools.

Use this coupon for more detailed information and school shop help

STANLEY

The Stanley Works • New Britain, Conn.

TOOLS • ELECTRIC TOOLS • HARDWARE • STEEL • STEEL STRAPPING

Educational Dept., Stanley Tools 47D Elm St., New Britain, Conn.

FREE ( ) Please send me Stanley Tool Catalog No. 84.
FREE ( ) Please send me the Stanley Electric Tool Catalog No. 12.
FREE ( ) Please send me "Yankee" Tool Book Y41.
FREE ( ) Please send me Stanley Screw-Mate Folder T192.

Please send me_____Router Books at 35¢ ea., postpaid.

NAME .....

SUBJECT YOU TEACH
OR POSITION .....

SCHOOL .....

CITY ..... ZONE ..... STATE .....

The COMPLETE Line for SCHOOLS

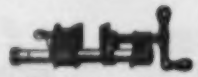
HARGRAVE CLAMPS

SPRING CLAMP

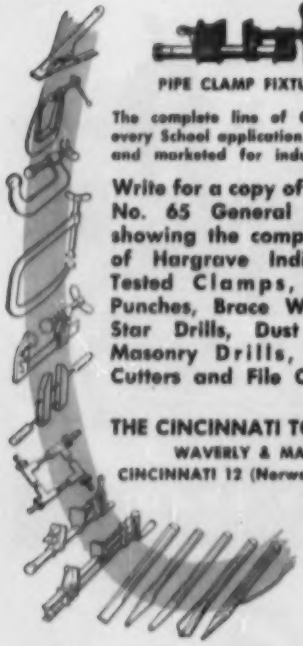
STANDARD CLAMP

WELDER'S CLAMP

IMPROVED "I" BAR CLAMP



PIPE CLAMP FIXTURE



The complete line of Clamps for every School application. Designed and marketed for industrial use.

Write for a copy of the new No. 65 General Catalog showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Brace Wrenches, Star Drills, Dust Ejector Masonry Drills, Washer Cutters and File Cleaners.

THE CINCINNATI TOOL CO.
WAVERLY & MAIN
CINCINNATI 12 (Norwood) OHIO

TEACHING MATERIALS

(Continued from page 20A)

Bean Division, John Food Mach. & Chemical Corp.
1305 S. Cedar St.
Lansing 4, Michigan

Beam Chamber & Caster Correction Instructions
John Bean Automotive Equipment
Operation Instruction for Model CS-17 Camber Tools
Wheel & Steering Alignment Tech. Manual, $2.00*

*individual copies are $2.00, but in quantities of twenty or more to schools or for vocational purposes, they are available at 78¢ each.

Bear Mfg. Co.
Rock Island, Illinois

Principles of Wheel Alignment, $1.50
Official Standards

Bee Line Company
Box 569
Davenport, Iowa

Ball-Joint Suspension Overhaul
Bee-Line Systems Frame Straightening
Bee-Line Systems Wheel Straightening
Bee-Line Catalogue

Bendix-Westinghouse Automotive Air Brake Co.
901 Cleveland St.
Elyria, Ohio

Air Brake Systems, Buses, IP5062
Air Brake Systems, Kit Equip., Trucks and Truck-Tractors, IP5061
Air Brake Systems, Trucks & Truck-Tractors, IP5063
Air Brake Systems, Trailers, IP5064
Air Supply Systems, Tire Service Trucks, IP5074
Brake Chambers, IP5073
Brake Fundamentals, Compressed Air, I, III, IV, V, XI, XII
Bus Air Brake Systems with D-1 Brake Valve, IP5062A
Maintenance Manual, BW1116, $1.00
Operating & Maintenance Instructions
Quick Release Valve, IP5069
R-1C Relay Valve, IP5071A
Truck & Truck-Tractor Air Brake Systems with D-1 Brake Valve, IP5063A
Type B4B Brake Valve (pedal), IP5070
Type D Brake Valve (treadle), IP5068
Type D-1 Brake Valve, IP5075
Type E Compressors, IP5076
Type HP Brake Valve (hand run), IP5067
Type R Relay Valve, IP5071
Type U Compressors, IP5065

Bendix Aviation Corporation
Bendix Products Division
South Bend 20, Indiana

Stromberg Carburetor, parts and units catalog, 10-D, $1.50
Condensed Catalog of Stromberg Carburetor Applications, 10-33, nc
Stromberg Carburetor — Principles of Operation, 10-520, nc
Bendix Vacuum Power — Parts and Units Catalog, 9E, $1.50
Bendix Power Brake Catalog, 9-500, no charge
Why Buy Power Brakes, 9-1400, NC
Load Rate Power Brakes, 9-1237, NC

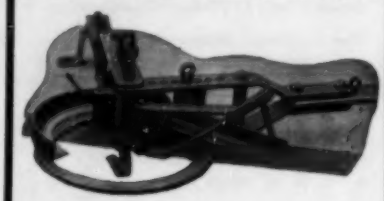
Bethlehem Steel Company
Bethlehem, Pennsylvania

Bethlehem Tool Steel Selector and Properties
Heat and Temper Color Slider
Steel in the Making

(Continued on page 24A)

Teacher's pet . . .

HOSSFELD
UNIVERSAL® IRON BENDER
Wrenchless Type — Model #1
Bends Flat, Round, Bar, Angle, Pipe



Samples of Bar Bending

HUNDREDS of shop instructors in vocational training departments of schools and municipal, state and government institutions are sold on the merit and utility of the Hossfeld Bender. Their maintenance departments, too, recognize it as practical and indispensable in the shop as a bench vise, capable of replacing a half dozen special machines. Proved in thousands of factories and repair shops as well, the Hossfeld Bender will neatly, quickly and accurately teach your students the 101 different bending jobs that they will be called on to perform in repair, maintenance and production work. For a better bender — specify Hossfeld.

SPECIFICATIONS

#1 Bending Capacities
Standard Pipe & Conduit — up to 1½" I.D.
Heavy Bends, Direct on Center Pin: "U" Bends on Cam Dies, 3" x 7/16" flat or ⅞" Round or Square Cold
Sharp Square Bends — 3" x ¼" Cold
Ornamental Iron Work — 2" x 3/16" Flat or ½" Round or Square, Cold
Eye Bolts — ½" Round or Square, Cold
Angle Iron — 1½" x 1½" x ⅛", Cold
Automobile Spring Eyes — 3" x ⅝", Hot
90° Bends on Conduit, Heavy Wall, or Standard Pipe — 1" Cold

GET THE FACTS!
Write today for illustrated bulletin.

HOSSFELD MFG. CO.
438 W. 3rd Street Winona, Minnesota

Brighter sound movies... in plenty of room light to write by... PLUS comfortably flicker-free silent movies with the same projector

Naturally, any movie looks its best when you show it in total darkness. But when you want to keep some light for note taking—or when you must put up with imperfect room darkening—you can *still* keep your sound movies brilliant with a *new* Kodascope Pageant Sound Projector. You can enjoy comfortably flicker-free silent-speed projection with the same projector, too. Here's why . . .

Remarkable new shutter gives complete versatility

Until recently, 16mm. sound projectors gave you a choice of *either* extra light power *or* two-speed versatility. Then Kodak engineers perfected the Super-40 Shutter—an ingenious device which can project more than 40% *more* light at sound speed than can standard shutters, and can also deliver smooth, standard-light silent projection . . . *automatically*.

This shutter is now built into every Pageant audio-visual model. What's more, it brings you two-in-one versatility at *no increase in price* over the previous Pageant models!

Other benefits assure outstanding, worry-free performance

The Super-40 Shutter is far from the only important exclusive Pageant benefit. Pageants are also permanently pre-lubricated to bypass the danger of improper oiling, main cause of projector breakdowns. Pageants have built-in field-sharpening elements that keep your pictures sharp over the whole screen area. And Pageant Fidelity Controls help you get the most from any optical sound track, regardless of its position.

Let your needs pick your Pageant

The new Pageant projectors with Super-40 Shutters are available with either 7- or 15-watt outputs, and 8″ or 12″ speakers. To choose the model best for your needs, ask your Kodak Audio-Visual Dealer for his experienced advice. He will give you a demonstration and complete details with no obligation to you. If you prefer, send the coupon for a catalog first.

Here's how the amazing new SUPER-40 Shutter gives you complete projector versatility

1. *Switch on at silent speed.* The Super-40 Shutter automatically presents three shutter blades to produce 48 light interruptions per second, the motion-picture-industry standard for comfortable flicker-free projection.

2. *Switch to sound speed.* Super-40 Shutter shifts automatically to two blades. You can see the picture brighten by more than 40%! Yet there are still 48 light interruptions per second, and your movies stay comfortably free from flicker!

3. *Or lock the shutter in 3-bladed position* when you don't need the extra brilliance. (To return to automatic shifting, just release the locking lever.)

New Signet Filmstrip Projectors give top performance—even with worn or damaged films

To deliver smooth, quick, reliable performance—even with damaged film—all Model 2F Kodaslide Signet Filmstrip Projectors now have a new, improved, enclosed film-advance mechanism. (This can be removed, if you wish, for standard 2 x 2 slide presentations.)

You enjoy bright, sharp pictures, too. All models have Kodak Ektanon Projection Lenses, *Lumenized* lens-and-condenser systems, and aluminized glass reflectors. These new Signets are available in 500- or 300-watt models, priced accordingly. Ask your Kodak Audio-Visual Dealer to help you choose the best one for your needs and budget.

WHAT A-V EXPERTS SAY ABOUT PAGEANT PRE-LUBRICATION

"Since we started selling projection equipment, our service department's major problem has dealt with the costly results of improper oiling. NOW, with lifetime pre-lubricated Pageants, our satisfaction matches only that of our customers."

Harold E. Hanson
Harold's Photography
Sioux Falls, S. Dak.

"Our experience indicates clearly that hit-or-miss lubrication is the chief cause of damage to school projection equipment. The Pageant Projector's permanent pre-lubrication totally eliminates this problem—and we're happy to endorse it."

Charles Baum
Baum's Sporting Goods, Inc.
Sunbury, Pa.

EASTMAN KODAK COMPANY, Dept. 8-V, Rochester 4, N. Y. 12-199

Send name of nearest Kodak Audio-Visual Dealer and information on:

- ☐ Kodascope Pageant Sound Projector
- ☐ Kodaslide Signet 500 and 300 Projectors, Filmstrip Models

NAME _____ TITLE _____
ORGANIZATION _____
STREET _____
CITY _____ (Zone) STATE _____

TEACHING MATERIALS

(Continued from page 22A)

Bicycle Institute of America, Inc.
122 East 42nd. Street
New York 17, New York

Bike Riding Clubs
Bicycle Safety Tests
Bike Regulations in the Community
Bike Fun
Safety Set

Black and Decker Mfg. Company, The
Towson 4, Maryland

Form #10 — 1955 Standard Catalog
Form #40 — Principles of Valve and Valve Seat Reconditioning
Black & Decker Portable Elec. Tools
Electric Polisher Use & Care Handbook
Principles of Valve Reconditioning
Valve Reconditioning Use and Care Handbook

Blackhawk Mfg. Company
5325 W. Rogers Avenue
Milwaukee 46, Wisconsin

Automotive Porto-Power Cat. #P-51
Blackhawk Hand Tool Cat. #W-101
Blackhawk Jack Cat. #J-100
Industrial Hydraulic Tool Cat. #H-201
The 1½-ton Warrior
One-End Bumper Lifting
Hydraulic Jacks, Save Money, Save Time, Save Drivers' Tempers!
Blackhawk Hydraulic Tools
Blackhawk Porto-Power, Hydraulic Equipment Helps you Earn

TWO NEW Starrett PRODUCTS
of special interest to school shops

Starrett
TOOL AND INSTRUMENT OIL

The same highly refined, clear lubricant made to our specifications and used by us at the factory. Now available in this handy tool box size can. Especially recommended for micrometers, precision measuring tools, fine instruments. Also for light machinery, appliances, guns, fishing tackle. Protects, lubricates, guards against rust.

Starrett
KLEENSCRIBE LAYOUT DYE

A blue dye specially prepared for layout work. Just brush it on with the handy brush in cap. Dries instantly to an opaque, no-glare finish that will not rub or flake off. Makes scribed lines stand out sharp and clear. Easily removed with denatured alcohol. 4 fluid ounce cans are handy, economical, easy to issue and store.

BIG NEW CATALOG -- FREE Describes and illustrates over 3000 Starrett Tools including many sets of tools for student. Also describes the many Starrett educational aids. Write for it. Address Dept. CE.

Starrett®
"WORLD'S GREATEST TOOLMAKERS"
75

Bonney Forge & Tool Works
716 Meadow Street
Allentown, Pennsylvania

C-2 Pocket Size Catalogue
D-2 Large Loose Leaf Catalogue
M-2 Large Bound Master Catalogue
Torque Charts — Specifications & Etc.
Tool Charts

Briggs & Stratton Corp.
2711 North 13th. Street
Milwaukee 1, Wisconsin

Repairman's Handbook
Small Engine Repair Charts
Parts — Service Data Manual, $3.00

Brown & Sharpe Mfg. Co.
Department 16W
235 Promenade Street
Providence 1, Rhode Island

Brown & Sharpe Handbook, $1.25
Cutters, #35C
Gaging Equipment, 335G
Machine Tools, "Training Aids" (wall charts, etc.)
Machinists Tools, #35M
Pumps, #35P
Screw Machine Tools, #35S

Bunting Brass and Bronze Company
715-755 Spencer Street
Toledo 1, Ohio

Bearings (standard stock, precision bronze bars, electric motor, graphited oilless) #52 and #152

Burd Piston Ring Company
1401 — 23rd. Avenue
Rockford, Illinois

No Job For a Dub Burd Handy Handbook

Carter Carburetor Company
Education Department
2840 N. Spring Avenue
St. Louis, Missouri

Carter BBD Carburetor
Carter Four-bore Carburetor (WCFB)
Carter Motor Tune-Up & Carburetor Service Instructions, $1.00
Carter Side-draft Carburetor (YH)
Carter YF Carburetor

Champion Spark Plug Company
Toledo 1, Ohio

Champion Aircraft Spark Plugs
Champion Engineering Manual
Champion Facts About Spark Plugs and Engines
Champion Spark Plug Features
Champion Spark Plug Service Chart
Champion Spark Plug Ser. Type Selector
Champion Spark Plug Size Chart
Spark Plug Checking & Cleaning Procedure

Choldun Mfg. Company
331 East Street
New Haven, Conn.

Automotive Service Equipment, #E-702

Chrysler Corp.
Educational Services
Public Relations Department
P. O. Box 1919
Detroit, Michigan

Educational Activities of Chrysler Corp.
Electrical Energy
Math Problems from Industry
New Horizons in Engine Development
Chrysler Shop Manual, nominal charge
De Soto Shop Manual, nominal charge
Dodge Truck Shop Manual, nominal charge
Plymouth Service Manual, nominal charge
Dodge Passenger Car Shop Manual, nominal charge

(Continued on page 26A)

For whatever your students need for their mechanical drawing work your "best bet" for satisfaction, quality and economy is K&E.

K&E drawing instruments, K&E drafting and reproduction materials, and of course K&E slide rules, are the traditional first choice of the professionals—engineers, designers, architects and draftsmen.

Do you realize the wide choice and price range that K&E offers in drawing instruments and sets? Do you know all the economies the K&E "School Line" offers?

We shall be glad to send you the latest K&E 1955-56 School Catalog if you will drop a line to Keuffel & Esser Co., Hoboken, N. J.

KEUFFEL & ESSER CO.

New York • Hoboken, N. J.

Detroit • Chicago • St. Louis

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Trade Mark

DO YOU USE THESE DELKOTE PRODUCTS?

DELKOTE® WOOD LACQUER is a unique new formulation, which embodies the best in modern lacquer technology. No finer finish is used—even on the highest priced furniture and the best pianos. Yet this lacquer is so formulated that it can be sprayed from an aerosol can!

Now your shop students can easily finish their handiwork with a professional-type lacquer. Two light coats, a little rubbing and polishing, give a deep, rich, long-lasting finish. This new aerosol product makes lacquer actually *easier to use than varnish.*

DELKOTE WOOD LACQUER was just introduced this past spring; yet it is already in use in hundreds of school shops and by maintenance personnel, home handy men, and hobbyists as well. Available in 12-ounce aerosol spray cans at $1.95 each, also in cartons of 12.

DELKOTE METAL LACQUER is a companion product, introduced at the same time. It is formulated to spray perfectly from the aerosol package, and is nonreactive to any metal surface.

It protects, preserves, and beautifies copper, brass, bronze, and aluminum. It prevents tarnishing. It eliminates the need for frequent polishing of hinges, doorknobs, stair rails, and fixtures. A useful material in the shop, it is also being used in school maintenance, office, and home . . . wherever brightwork is a problem.

Like DELKOTE WOOD LACQUER, the METAL LACQUER comes in 12-ounce self-spraying aerosol cans at $1.95 apiece, and in cartons of 12. Mixed cartons are available on special order.

55-V-1

Both DELKOTE WOOD LACQUER and DELKOTE METAL LACQUER are sold by leading school supply distributors. If your regular supplier does not carry them, order direct.

DELKOTE, Incorporated
Box 1335, Wilmington 99, Del.
Box 574, Berkeley, California
Also makers of BOOK SAVER, BOOKOTE and DEL FIX

TEACHING MATERIALS

(Continued from page 24A)

Cities Service Petroleum, Inc.
60 Wall Street
New York 5, New York

Automotive Combustion & Lubrication
Cities Service Combustion Analysers
Engine Cleansing
More Power to Your Car
Presenting Power Proven

Cleveland Twist Drill Company
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Cleveland 14, Ohio

Decimal Equivalents of Drills
Ready Reference Charts
"U & C of Reamers"
"U & C of Twist Drills"

Clover Mfg. Company
327 Main Avenue
Norwalk, Conn.

Coated Abrasives, A handbook & digest of coated Abrasive Technology

Cushman Motor Works, Inc.
900 N. 21st. Street
Lincoln 1, Nebraska

Cushman Shop Manuals
Cushman Shop Booklets

Delco-Remy Division
General Motors Corporation
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Anderson, Indiana

12-Volt Electrical Equipment for Passenger Cars
New Delco-Remy Ignition Coil and Condenser Demonstration Kit, $1.50
Delco-Remy Operation and Maintenance Handbook, DR-324
Delco-Remy Test Specifications Booklet, DR-324S
Fundamentals of Elec. & Magnetism, DR-5133A, 25¢
Storage Batteries, DR-5133B, 25¢
Cr. Mtrs. & Series Parallel Sws, DR-5133C, 25¢
The Ignition System, DR-5133D, 25¢
Generators, DR-5133E, 25¢
Standard Duty Generator Regulators, DR-5133F, 25¢

Delta-C&S Air Lines
Municipal Airport
Atlanta, Georgia

A Visit to Delta-C&S Headquarters

Delta File Works, Inc.
4837 James Street
Philadelphia 37, Pennsylvania

Delta Files Catalogue #101
Delta Rotary Files
Files — How to Select, Use, and Conserve Them

Department of Commerce
U. S. Coast and Geodetic Survey
Washington 25, D. C.

Coast and Geodetic Survey Activities
The U. S. Coast and Geodetic Survey — Its Work and Products
Catalog of Nautical Charts and Related Publications
Aeronautical Chart Catalog
Map Projections for Modern Charting
World Charts on the Azimuthal Equidistant Projection

DeVilbiss Company, The
Toledo 1, Ohio

Auto Dealers' Guide to Paint Shop Equipment
DeVilbiss Refinishing Equipment A-50
Making the Most of the Spray Painting Method

WHAT'S NEW IN PLASTICS FOR THE SCHOOL SHOP

Plastic Parts & Sales now brings you a variety of amazing new plastic materials that mean a real opportunity for shop teachers to make tremendous advances in their plastic craft programs. The outstanding properties of these plastics have been proved in many different types of industrial applications. The possibilities which they offer you and your students to profit from new ideas . . . new projects . . . new processes are unlimited.

VINYLAIRE Plastic Foam

In character, Vinylaire is a closed cell structure composed of a multitude of uniform size individual cells. It is free from voids, seams, contaminants, and any ingredients that accelerate aging and deterioration. Non toxic. It is impervious to body acids, oils and various chemicals, chlorinated and salt water. It is water repellant — has better buoyancy than cork or kapok. It can be heat sealed, fabricated, cemented to wood, leather, fabric and metal; stitched, riveted; die cut and sawed. It is flame and cold resistant. Can be washed with soap and water, cold sterilized. 28% lighter than rubber, it is shock resistant, and will not "bottom." Commercial uses include life preservers, protective padding for athletic equipment, orthopedic braces, etc. 36" x 48" sheets; ¼" through 2" thick. White, only.

MYLAR Polyester Film

0.001" and thicker. It is the strongest of all plastic film. Retains its properties and flexibility over a temperature range of from minus 80 deg. to 300 deg. F. Is unaffected by oils, grease, most acids and alkalis. Resists moisture and solvents. Has exceptional dielectric strength. Ideal for insulation for motor stator, generator, and solenoid coils, capacitor; crashproof kites. When laminated and embossed, it provides a variety of new materials for decorative paneling, window shades, belts, etc.

White Polyethylene Rope

It floats! Produced by the twisted-spun-laid method. It's attractive, long lasting, lightweight, dimensionally stable. Completely waterproof and buoyant. 30% lighter than natural fibre rope. Has extremely high resistance to virtually all types of acids and solvents, salt water, alcohol. It is unaffected by mold, bacteria, rot, fungi. Has excellent weathering characteristics. Does not deteriorate with age. Available in 3/16" to ¾" dia. Ideal for water ski tow lines, swimming pool marking lanes, heaving lines and other life-saving equipment, functional and decorative applications.

FIBERGLAS-POLYESTER AND EPOXY RESINS

Build Sports Car Bodies, Boats, Work Bench Tops, Awnings, Furniture, etc.

Send for FREE literature giving complete buying information on everything you need in Fiberglas-Plastic for the school shop. It describes in detail Glass Cloth, Resins, Extenders, Catalysts, Solvents, "How-To" Books, etc. Also includes sample of this remarkable material for your inspection. Write today! . . . and plan to get everything you need for the above and other high interest projects from Plastic Parts & Sales.

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Our "COVER-IT KIT" contains the right amount of material for the beginner student, or to experiment with yourself. Let's you see how easy it is to repair boats, toys, lamps, furniture, etc. Complete Kit.....$3.95 (plus 50c postage.)

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Spray Gun Motion Study
The ABC of Spray Equipment

Diamond T Motor Car Company
Service Department
Technical Division
4101 W. 26th. Street
Chicago 23, Illinois

Diamond T Service Manual

Dow Chemical Company
Midland, Michigan

Finishing Magnesium
Forming Magnesium
Joining Magnesium
Machining Magnesium
Magnesium Alloys & Products

Dualoc Drive, Inc.
700 Twentieth Street
Rockford, Illinois

Power-Dividing Differential

Du Pont Company
Room 8163
Du Pont Building
Wilmington, Delaware

DuPont #7, Brake Fluid, #A-6812
DuPont #7, Spray Glaze #A-554
Facts About Antifreeze, #A-6132
Serviceman's Manual on Automotive Cooling System, #A-2183, $2.00

Edelmann and Company, E.
2332 Logan Blvd.
Chicago 47, Illinois

Anti-Freeze Solution Testers
Automotive Brass Replacement Fittings
Battery Fillers & Servicers
Battery Hydrometers
Copper Tubing Tools
Flexible Gas & Oil Lines
Ignition Timing Lights
Universal Oil Filter Lines

Electric Storage Battery Company
P. O. Box 8109
Philadelphia 2, Pennsylvania

Parts and Assembly of a Lead Type Storage Battery
Storage Batteries & The Services for Which they are Used.
The Storage Battery, Its Fundamentals, Use & Maintenance

Federal Mogul Corp.
Service Division
600 W. Chicago Blvd.
Detroit, Michigan

Engine Bearing Service Manual, $1.00

Ford Motor Company
Educational Relations Department
3000 Schaefer Road
Dearborn, Michigan

Deft Driving
How Long Is A Rod
Human Bridge
Industrial Arts Awards Rule Book
Summary of Studies in Industrial Education
Film Catalogue
How a Car Is Assembled
Lubrication Charts
Stopping Distance Charts
Ford Passenger Car Shop Manual
Ford Truck Shop Manual
Lincoln Chassis Manual
Lincoln-Mercury Body Manual
Mercury Chassis Manual
Driver Education Kit
Evolution of the Motor Car (photographs)

Gatke Corporation
228 N. La Salle Street
Chicago 1, Illinois

Engineering Brake Adjustment Chart

(Continued on next page)

Modern
Skill Builders...
New Precision Tools that help train Future Craftsmen

← **NEW** Magnicator. A highly versatile support for dial indicators. Completely-releasing permanent magnet base permits use in any position on flat or round surfaces. Push-button controls holding power.

NEW Super-Vernier Calipers. America's most easily-read vernier calipers. Dull-chrome, recessed background for graduations and figures eliminates reflections. Double-length vernier plate. Sizes 6, 12 and 24 inches. →

NEW Chrome Finish Steel Rules. America's most easily read rules. Jet-black figures and graduations on dull finish stand out in any light. Resist corrosion, rust, and wear. Decimal or fraction.

Students get the most out of instruction when you train them with Brown & Sharpe Tools . . . the tools that craftsmen prefer. Advanced in design . . . consistently "tops" in quality, these modern precision tools have won the respect of the metal-working industry. Using them, your students will rapidly develop confidence and skill . . . a true appreciation for fine workmanship. Write for Catalog 135. Brown & Sharpe Manufacturing Co., Providence 1, R. I., U.S.A.

BUY THROUGH YOUR LOCAL DISTRIBUTOR

Brown & Sharpe

TEACHING MATERIALS

(Continued from previous page)

General Electric Company
Lamp Division
Nela Park
Cleveland 12, Ohio

Safety Lighting Service
General Electric Publications for Schools — 1955–1956 Catalog

General Exchange Insurance Corp.
General Motors Corporation
Detroit 2, Michigan

Sheet Metal Correction, no charge

General Motors Corporation
Detroit 2, Michigan

Rochester Products Divn.
Rochester Carburetors Operation/ Maintenance, NC

Diesel Equip. Divn.:
Hydraulic Valve Lifters

Fisher Body Divn.:
Designing, Modeling & Building a Model Car, F
Fisher Body Service News (specify body part)

Central Office:
ABC's of Hand Tools
A Power Primer
Can I Be A Craftsman?
Electricity and Wheels
Metallurgy and Wheels
Key to Careers in the Retail Automotive Business
Optics and Wheels
Detroit Diesel Engine Application Data
Detroit Diesel Engine Tune-Up Film Strip
Detroit Diesel Engine Manuals and Handbooks
Detroit Diesel Engine Charts
Detroit Diesel Engine Oil Flow Diagrams
A to Zero of Refrigeration
Diesel, The Modern Power
How the Wheels Revolve
1900 to 19XX
The Big Road Test
How to Plan and Pay for Better Highways
The Automobile Story
Transportation Progress
Driver Training Kit for Teachers
We Drivers

AC Spark Plug Divn.:
AC Spark Plug Shop Manual
AC Fuel Pump Shop Manual

Buick Divn.:
Buick Shop Manual
Dynaflow Transmission Chart, NC

Cadillac Divn.:
Cadillac Shop Manual

Chevrolet Divn.:
Chevrolet Passenger Car Shop Manual
Chevrolet Truck Shop Manual

GMC Truck & Coach Divn.:
Why Preventive Maintenance?
GMC Truck Maintenance Manuals

New Departure Divn.:
New Departure Handbook, NC

Oldsmobile Divn.:
Oldsmobile Shop Manual

Pontiac Motor Divn.:
Hydra-Matic Shop Manual
Pontiac Shop Manual
Pontiac Service Craftsman's News
Pontiac Service Training Manuals

Delco-Remy Divn.:
Delco-Remy Training Charts
Better Ignition
Delco-Remy Educational Program
Heavy Duty Generator Regulators
Standard Duty Generator Regulators
Delco-Remy Operation and Maintenance Handbook, NC
Delco-Remy Test Specifications, NC
Delco-Remy Training Chart Manuals, NC

Gladden Products Corp.
Glendale 4, California

Manual and Parts Catalogues, Series 40, 50 and 75 Engines
Operation/Maintenance (mustang Motorcycle)

Globe-Union Inc.
900 E. Keefe Avenue
Milwaukee, Wisconsin

AABM Service Manual

Guide Lamp Division
General Motors
Detroit 2, Michigan

Aim to Please
The Autronic Eye
Guide Automotive Lighting Service Manual

Hastings Mfg. Company
Hastings, Michigan

Hastings Technical Bulletin, monthly

(Continued on page 30A)

C&P NEW SERIES PRESSES These presses in sizes of 8x12, 10x15, 12x18 and 14½x22, provide the student with equipment that furnishes all practical requirements of hand fed press operation. May be equipped with flywheel, belt and platen guards. Also furnished for treadle operation instead of motor drive.

CHANDLER & PRICE
PRESSES and PAPER CUTTERS

C&P BENCH CUTTER An efficient, small size cutter that handles sheets up to 19" x 24". Equipped with two-handed safety control.

The Standard for Printing Education

C & P presses and paper cutters have been standard equipment in commercial plants and schools for over 50 years. So, the selection of C & P equipment for printing classes places before the students *practical* equipment exactly as used in commercial practice in the entire printing industry.

In addition, special safety features are incorporated, when desired, in C & P presses and paper cutters so that all safety requirements are fully satisfied.

For practical instruction—for safety in use—the foresighted administrator recommends . . . Chandler & Price.

"HANDBOOK OF PLATEN PRESSWORK" is one of the outstanding aids to printing furnished without charge to printing instructors. If you do not have a copy, just request one.

C&P PILOT PRESS A thoroughly efficient little press, chase 6½x10, that teaches basic principles of press operation with exceptionally fine printing results.

THE CHANDLER & PRICE COMPANY
6000 CARNEGIE AVENUE • CLEVELAND 3, OHIO

The NEW Blount Model VS 55 Lathe

For details, ask for BULLETIN SD-14

designed for manual training shops
used for BOTH woodworking and metal spinning

VERSATILE:
A single lathe for woodturning and metal spinning . . . 12" swing over main bed . . . 16" swing over gap . . . rear face plate.

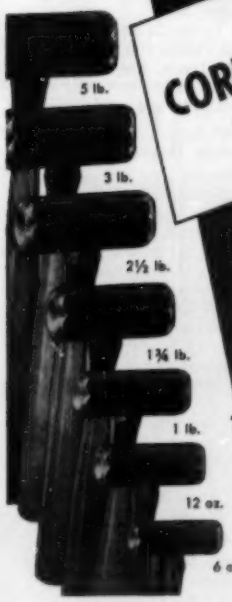
SAFE:
Speed control interlocked with "start" switch prevents accidental starting plywood surfaced shelf protects cutting tool edges from damage.

SIMPLE OPERATION:
Button "start" . . . single speed lever . . . press down spindle lock . . . self-ejecting tailstock center.

SIMPLE MAINTENANCE:
Built-in cabinet for storing tools prevents loss . . . streamlined surfaces for easy cleaning.

J. G. Blount COMPANY 23 WOODLAND ST., EVERETT, MASS.

PICK THE CORRECT HAMMER
FOR EVERY STEEL STAMP, CHISEL, STAR DRILL, OR SLEDGING APPLICATION



Mecco SAFETY ENGINEERS' HAMMERS "STYLE OE"

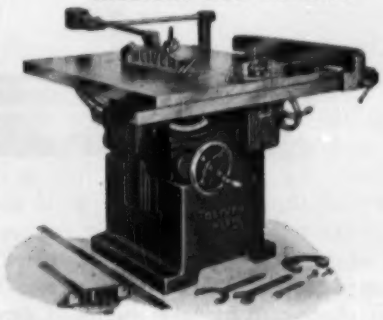
To minimize spalling and mushrooming, "Style OE" Hammers are machined of Mecco Safety Steel, carefully heat treated in sizes to meet your needs. Available in the right weight for every application.

Write for complete data

Mecco SAFETY MARKING TOOLS M.E.CUNNINGHAM CO.
1037 CHATEAU STREET, PITTSBURGH 33, PA.

OLIVER Saw Benches are built to make easy work of hard cuts

No. 270 is a compact medium size machine



This industry-proven Oliver is built for accurate ripping, cross-cutting, dadoing and mitering. Saw arbor tilts up to 45°. Gauges and table are graduated to cut a perfect miter, cut off to length, or rip to width accurately — no delays for checking measurements. Rips to 16" wide to left of saw, 29" to right. Cross cuts up to 16" wide, 3" thick. Write for Bulletin No. 270.

No. 232 is smaller . . . a favorite in school shops

A sturdy Saw Bench that rips, cross cuts, dadoes, miters with accuracy and ease. Saw arbor tilts up to 45°. Has automatic anti-kick back catch for safety. Gauges and table accurately graduated. Write for Bulletin No. 232.

OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICHIGAN

TEACHING MATERIALS

(Continued from page 28A)

Heyer Industries, Inc.
471 Cortlandt Street
Belleville 9, New Jersey

Auto Tune-Up Equipment and Battery Servicing Equipment

Hobart Brothers Company
Hobart Square
Troy, Ohio

Arc Welding News
Carbon ARC Welding
How to Build Your Own ARC Welder
Modern Lessons in ARC Welding, $1.00
Modern Welding, A Text Book, $3.00
Pocket Guide to Better Welding
Welding — Hundred Ways It Pays

Holley Carburetor Company
11955 E. 9 Mile Road
Van Dyke, Michigan

Engine Principles and Automotive Tune-Up Fundamentals, $2.00

Hoof Products Company
6543 S. Laramie Avenue
Chicago 38, Illinois

Velocity and Mechanical Governors

Illinois Central Railroad
135 East Eleventh Place
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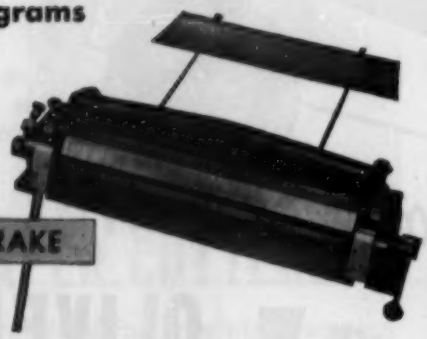

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Turning a knob provides infinite adjustment to any angle from 0° to 135°. Forms any size box or pan from ½" to 24" by ¼" graduations. Makes intricate folds, reverse bends and radius bends on sheet metal up to 16 gauge and up to 24" wide. Bending leaf operates on Torrington Needle Bearings. Full 1" clearance between top fingers and anvil. Maximum 2½" box or pan depth permits deeper bends.

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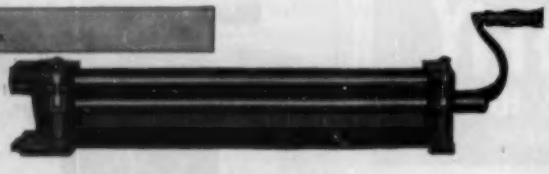

Finger-tip controls on both ends of top roll permit quick adjustment for any material thickness of unit. Will accurately roll 24" widths in 20 gauge mild steel — heavier gauges in narrower widths. Removal of work is easily accomplished due to the spring loaded, hinged, top roll. Heavy duty rolls 1½" diameter — distortion proof channel iron base, enclosed gears and oilite bearings are a few of many features.

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(Continued on page 32A)

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(Continued from page 30A)

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Micrometer Reading Made Easy
Pocket Size Decimal Equivalent Card
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Time Saver Drill Size Calculator
Amazing Story of Measurement
Automotive Catalogue

Lynch Corporation
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"Par" Air Compressors

McQuay-Norris Mfg. Co.
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402 Chandler Street
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How to Service Ball Bearings in Automotive Equipment, 4 booklets

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Decatur, Illinois

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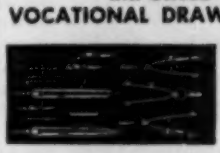

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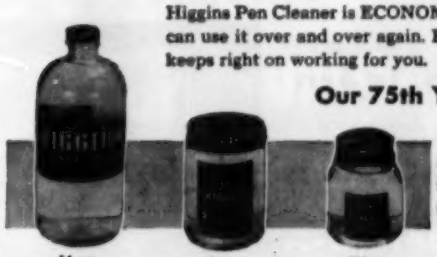

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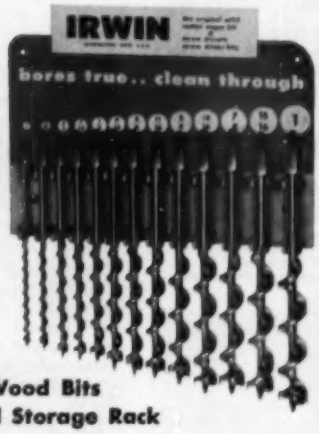

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VISIT BOOTHS 102-105 AVA CONVENTION

PERSONAL NEWS

(Continued from page 6A)

He belonged to many professional organizations and served in one capacity or other in most of them.

DR. LEWIS M. WIGGIN GIVEN APPOINTMENT

Dr. Lewis M. Wiggin, assistant dean of Yale College, has been appointed director of student activities and of the Gould Student Center at the University Heights campus of New York University.

Dr. Wiggin will supervise the extracurricular activities of 2200 students at the University College of Arts and Science and the College of Engineering, which share N.Y.U.'s campus in the Bronx. He succeeds Assistant Professor Alan Coutts, who came to N.Y.U. in 1938 and is leaving to become dean of men at the University of Vermont.

DR. WILLIAM D. WILKINS

Dr. William D. Wilkins, specialist in counselor training for the past 15 years, has been appointed chairman of the department of guidance and personnel administration at the New York University School of Education.

A professor of education at N.Y.U., Dr. Wilkins joined the University's faculty in 1949. Before that he taught at the College of New Rochelle (New York) and at Loyola University in Chicago. While in Chicago he also served as psychologist at the Marillac Social Center.

For two years during World War II, Dr. Wilkins was the army's chief psychologist at Fort Leavenworth, Kans. Later he was in charge of counseling at Fitzsimmons General Hospital in Denver. He is currently a consultant in counseling psychology for six New York hospitals of the Veterans Administration.

The author of more than 40 articles on vocational guidance for professional publications, Dr. Wilkins is a book consultant for a number of New York publishers and has been editor of the "Personnel and Guidance Journal" for five years.

He received his bachelor's degree at Loyola University and his doctor of philosophy degree at Northwestern University, Evanston, Ill.

DR. BARNARD HELPS PLAN D.A.V.I. MEET

As president of the Wisconsin Department of Audio-visual Instruction, David P. Barnard, director of the audio-visual center at Stout State college, helped plan future activities at a July board of directors meeting of the Department of Audio-visual Instruction of the National Education Association.

Future projects included plans for the national DAVI meeting in Detroit in March, arrangements for the publication of the national association's magazine, and policy decisions regarding the National Field Service Program of the organization.

ROBERT M. REESE LEAVES FOR AFRICA

Professor Robert M. Reese, Ohio State University, Columbus, Ohio, and American Vocational Association vice-president for trade and industrial education, was scheduled to leave for Sierre Leone, Africa, on September 30, to act as consultant to the Ministry of Education of the British and Sierre Leone Governments on the expansion of four technical schools.

♦ Dr. Verne C. Fryklund, president of Stout State College, Menomonie, Wis., took part in the deliberations dealing with "How Can Education Be Financed in an Equitable Manner and at a Level of Support Which Will Insure the Greatest Development of Our Human Resource," at the Regional Meeting of the White House Conference held at Eau Claire, Wis.

♦ Dr. John A. Jarvis, dean of industrial education at Stout State College, assisted in planning and summarizing the work of the Regional Meeting of the White House Conference held at Eau Claire, Wis.

♦ Talmage Nichols, assistant director of school plant planning for Kanawha County Schools, has assumed the supervisory activities for industrial arts for Kanawha County, W. Va.

♦ J. Jackson Townsend joined the trade and industrial education staff as assistant state supervisor, Kanawha County, Charleston, W. Va. Mr. Townsend taught drawing at Weston High School for the past nine years. He taught at Flemington High School before entering military service. He received his degree from West Virginia University.

♦ Dr. Verne C. Fryklund, president, Stout State College, has been named dedication speaker of the new vocational arts building of Nebraska State Teachers College at Kearney, Neb.

He will give the main address on "Only a Free People Can Be Educated."

♦ William Lee Hodge, teacher of industrial arts, Palmer Elementary Shop, Springfield, Ill., has been made vice-president of the Illinois Association of Classroom Teachers, and has had an article published in the April, 1955, issue of *Illinois Education* entitled "We Need to Put First Things First in American Education."

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Crow Basic Electronics Kit...Model 50-A

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● Here's another important "first" from Crow Electri-Craft—electronics by visual experiment! This unique new kit is designed for students who have completed the Beginners' Electricity course with Crow Electri-Kit Model 41-B or equivalent training. It permits them to advance immediately into the study of electronics. They learn by doing; that is, they verify electronic principles by building their own operating assemblies . . . the most fascinating and effective instruction method ever devised.

Model 50-A contains 82 precision-made components—everything needed to perform 60 experiments in electronic fundamentals. A 275-page, illustrated manual in worksheet form is also included. It guides students step-by-step . . . shows what parts are needed for each assembly, how to set it up, and how the theory involved is put to practical use.

This Basic Kit provides a solid foundation for further training in specialized electronic fields—Radio Transmitting and Receiving, Industrial Electronic Circuitry, or Basic Radar and Television Circuitry. All of these principles are covered in the Crow Electronic Tubes, Circuits and Devices Kit (Model 53) available soon.

60 Operating Assemblies

Capacitors • Voltage Dividers • Vibrators
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Electrical Indicating Instruments
Rectifiers • Fly-back Voltage Supply Principles

Crow Basic Electronics Kit Model 50-A
82 parts including precision meter (±1%), precision resistors, coils, potentiometer, rectifiers, capacitor bank, etc., plus 275-page manual. All parts mounted for use with "Kwik-Klip" solderless connectors. Supplied in sturdy corrugated case..... $67.50

Hardwood Carrying Case
For Model 50-A. Has pegboard top and clip hinges. Can be used as baseboard for experiments..... $2.75

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News Notes

PITTSBURGH PLATE $4,000 SCHOLARSHIP OFFERED AGAIN

Pittsburgh Plate Glass Company is offering for the fourth straight year its $4,000 science and engineering scholarship to an outstanding high school male senior at Mount Vernon, Ohio, Richard B. Tucker, vice-president of the firm announced. Mount Vernon is the site of the company's largest window glass producing plant.

Mr. Tucker revealed the scholarship is designed to stimulate interest and encourage talented high school students to take advantage of the unlimited opportunities in the science and engineering fields.

The winner will be selected next spring by an award committee headed by Dr. Webster N. Jones, vice-president of Carnegie Institute of Technology; Dr. Joseph H. Koffolt, chairman of the Chemical Engineering Department at Ohio State University; and Robert B. Brown, secretary of Kenyon (Ohio) College.

NINE FELLOWSHIPS ANNOUNCED BY M-H

Nine postgraduate fellowships will be awarded by Minneapolis-Honeywell Regulator Company for the 1955–56 school years, the company announced recently.

Glenn E. Seidel, Honeywell's vice-president in charge of engineering, said the awards include a new fellowship in engineering or physics at the University of Pennsylvania and establishment of a second engineering or physics grant at Iowa State College.

Now in its tenth year, the Honeywell fellowship program provides tuition and living allowance awards to outstanding graduate students who need financial assistance to continue their studies. Grants range from $1,200 to $2,700 for the school year, depending on the school's tuition rate.

Other awards to be made by the company for the current school year include two to the Institute of Technology or the Department of Physics at the University of Minnesota, one in the electrical engineering servo-mechanisms laboratory at Massachusetts Institute of Technology, one in engineering or physics at Purdue University, one in plastics and chemical technology at North Dakota State College, and one awarded through Tau Beta Pi, honorary engineering fraternity.

♦ The Western Pine Association, Yeon Bldg., Portland 4, Ore., recently published "For Your Own Operation Attic!" designed to supplement the association's new how-to-do-it color and sound movie, "Operation Attic!"

The publication details in print the steps necessary to finish an attic in wood paneling.

The movie tells the story of a young couple who planned to finish their attic, and shows how they did it.

With each booking of the movie through the Association, 50 copies of the publication "For Your Own Operation Attic!" will be forwarded free of charge. Extra copies are available at a cost of one cent each, or ¾ of a cent each for quantities over 500.

♦ Participating in the annual Stout State College driver education and training program, sponsored from August 1 to 12, were 154 persons, one of the largest of such undertakings in the nation.

Of this group, 93 were individuals enrolled for college undergraduate or graduate credit as driver training teachers.

Directing the driver education and offerings was R. F. Kranzusch of the Stout State College faculty. Guest specialists included Dr. Harold O. Carlton, consultant in driver education for AAA's national office; Paul Bernd, AAA consultant of Washington, D. C.; Ben Precourt, safety director for the Wisconsin Division of AAA.

R. C. Salisbury, director of highway safety for the Wisconsin Motor Vehicle Department; Orlo Miller, of the Wisconsin Department of Public Instruction; and Dean Frey, assistant safety director for Wisconsin's AAA division.

♦ Association Films, a leading distributor of free-loan films, is making available a series of booklets describing pertinent films for community showings.

More than 200 such films are available for club, factory, and church use. For men's clubs, Association has chosen 33 films of particular interest to male audiences. Subject matter includes a film on racing at Indianapolis speedway, research into heart disease (with simple rules of health), and a travelog of America's historic and scenic points of interest.

Separate booklets are available free for: Men's Clubs, Women's Clubs, Churches, Industry and Business, Farm Groups, Grade Schools and High Schools.

A special booklet, *What's New in Free Films*, is available for any organization interested in the latest program material. Copies of this literature may be had by writing Association Films, 347 Madison Avenue, New York 17, N. Y.

♦ The Visual Education Consultants, Inc., 2066 Helena St., Madison 4, Wis., recently released a 23-frame filmstrip titled "The Ways Our Laws Are Made."

This filmstrip shows how the large majority of our laws which start in the House of Representatives are processed. It is suitable for use in junior high school groups and up through adult groups.

B-G Presents-

CRAFT PROJECT UNITS

The units illustrated in this ad will provide creative interest for students in woodworking, plastics and metal working.

Imported Clock Movements

No. 905

60 MM

No. 155

Desk

8-Day

No. 905 ROUND ALARM

Polished brass case 2½" dia. x approx. 1⅛". Face of polished brass, legs detachable for flush case mounting. Price, each.....$3.90

60 MM BAROMETER MOVEMENT

This is a fine quality unit polished brass case 2⅛" square x approx. 1⅛" deep. Face is polished brass. Price, each.....$4.15

No. 155 ELECTRIC

Made in U. S. by Sessions. Attractive 4⅛" dia. face with brass rim. Movement fits 4" dia. hole. Depth approx. 1⅛", back detachable. Complete with cord and plug for 110 volt wall outlet. Price, each.....$4.75

7-JEWEL DESK ALARM

Beautifully finished appearance. All parts highly polished brass. Base can be mounted or detached to suit project. Clock face 2½" x 1⅜". Back is round and fits 1 13/15" dia. hole. Depth approx. ⅝". Price, each.....$7.90

8-DAY MOVEMENT

Attractive 4½" dia. face with polished brass rim. Movement fits 4½" dia. hole. Depth approx. 1⅛", back detachable. Price, each.....$6.35

Also Desk Set Parts and Music Box Movements

Write for new 1956 B-G Catalog

BRODHEAD GARRETT CO.

50 Years Serving School Shops of America

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New Publications

General Leathercraft

By Raymond Cherry. Paper cover, 144 pp., 7¼ by 10¼ in., illus., $1.50. McKnight & McKnight Publishing Co., Bloomington, Ill.

This is the fourth edition of this book. It has been rewritten, reillustrated, and supplied with all new projects and project designs.

It contains 31 projects, 17 beautiful decorative designs, and there are 365 photographs and drawings. The carving designs are especially noteworthy. They were produced for this new fourth edition by Ken Griffin, nationally known leather carver and designer. Carving is the most challenging part of the leather craft, and Ken Griffin's fine designs for beautiful leather articles will tickle the imagination of every craftsman.

Elements of Electronics

By Henry V. Hickey and William M. Villines. Cloth, 487 pp., 6⅜ by 9¼ in., illus., $6.50. McGraw-Hill Book Co., Inc., New York City.

A very comprehensive text on the fundamentals of electronics. The authors have tried to present the subject in a practical manner with a minimum of data.

The book presents both the mathematics and the physics of electronics so that the earnest student is well prepared for taking up advanced studies in the subject.

The book contains 30 chapters each of which may be looked upon as a unit, which can be finished in one day.

The book also has an appendix which contains a list of the elements; common abbreviations and symbols used in electronics; the standard color coding used for resistors, capacitors, loud-speakers and transformers; common schematic symbols used in electronics; conversion units; solid annealed-copper-wire table; and natural trigonometric tables.

Shop Theory

By Fred Nicholson. Fourth revised edition, cloth, 329 pp., 8½ by 11¼ in., illus., $4.48. McGraw-Hill Book Co., Inc., New York City.

A text prepared by the shop theory department of the Henry Ford Trade School, which was later revised by Fred Nicholson.

This book, which is the fourth edition, gives the student quite a comprehensive idea of what tools are used by the machinist or toolmaker, and how these tools are used.

The 21 chapters of the book discuss small tools, chisels and chipping, hack saws and sawing, files and filing, soldering, measuring tools, drills and drilling operations, tapers, threads, gearing, cutting tools, shapers, planers, lathes, turret lathes, milling machines, gauge and gauge blocks, heat treatment, abrasives and grinding wheels, grinding machines, routing of bench tool work, appendix, and a correlated list of visual aids.

Shopwork on the Farm

By Mack M. Jones. Cloth, 626 pp., 6¼ by 9¼ in., illus., $4.96. McGraw-Hill Book Co., Inc., New York City.

This is a fine book for agricultural students, or farm boys.

It is well written and excellently illustrated. It explains thoroughly how to plan and equip a home farm shop; shows how sketches and drawings are made; discusses woodwork and carpentry; shows how power tools may be used safely; gives directions for sharpening and fitting tools; tells how to do rope, leather, and concrete work; discusses soldering, sheet-metal, and cold-metal work, farm blacksmithing, plumbing and pipe work, electric and gas welding and cutting; and maintaining machinery and electrical equipment.

Problems on the Design of Machine Elements

By Virgil M. Faires and Roy M. Wingren. Paper cover, 148 pp., 6 by 9 in., illus., $2.25. The Macmillan Co., New York 11, N. Y.

This is the third edition of this text on machine design.

The various chapters explain how to make analyses of stresses; calculate problems which involve variable loads and stress concentrations; screw, riveting, and thin-shell cylinders, springs, columns, and combined stresses.

The book also discusses shaft design, keys and couplings, journal and plane surface bearings, flat and V belts, chains, and wire ropes.

There also are problems on the various types of gears, brakes, and clutches. The last chapter presents a number of miscellaneous problems.

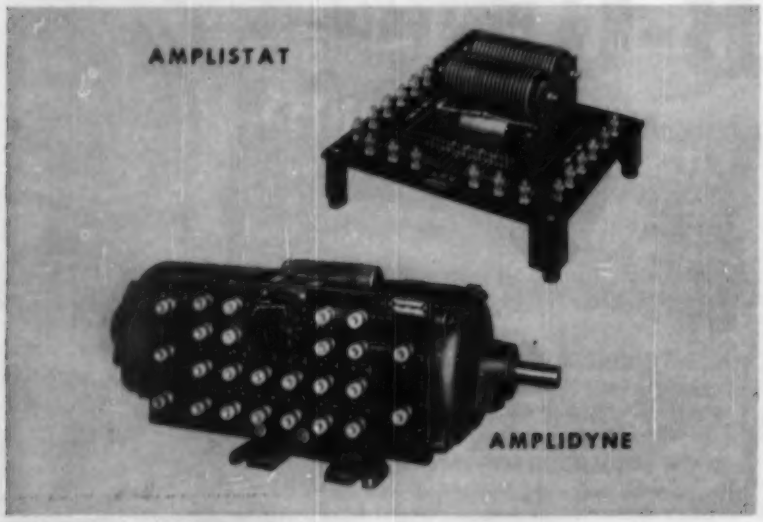
The appendix contains tables of properties of metals, sections, moments of deflections, design stresses of springs, properties of wire rope, etc.

Handbook of 630-Type TV Receivers

By Simon S. Miller and Howard Bierman. Paper, 194 pp., 5½ by 8½ in., and 2 pullouts, illus., $3.50. John F. Rider Publisher, Inc., New York 13, N. Y.

A book which will present the *whys* and the *hows* to the beginner of the 630-type receiver section and the modifications and the improvements that have been made on them.

Louisiana produces enough oil every ten days to pay for the Louisiana Purchase. — *Petroleum Newsnotes.*



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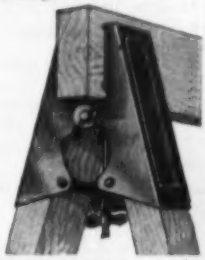

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R x 10	250	10,000
R x 100	2,500	100,000
R x 1,000	25,000	1 megohm
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Shop Equipment News

SOUTH BEND LATHE FALL SPECIALS

Special prices for October and November, 1955, on 10-in. by 3½-ft. South Bend light ten Model A precision bench lathe, with hand-lever bed turrets, or tailstock type turrets; high speed twist drill sets, ¼, ⅜, and ½-h.p. motors; external and internal grinding attachments; collet sets; and many other accessories; have been set by the South Bend Lathe Works. Take advantage of them while they last.

(For Convenience Circle Index Code 1001)

NEW "12-IN-1" ROTARY MACHINE

"Twelve Machines in One," the new and versatile Niagara No. 150 Hand Operated Deep Throat Combination Machine has just been added to the extensive Niagara line of power and hand operated Rotary Machines.

Niagara No. 104 Multi-Drive Power Table for Motorizing Hand Machines

Readily equipped with 12 different pairs of standard rolls, this machine can perform a wide variety of jobs: turning, burring, wiring, elbow edging (3 types), single beading, OG beading, crimping, furnace collar edging, body flanging, slitting, and trimming.

Featuring deep throat construction and longer shaft ends for wider rolls, the Niagara No. 150 is ideally suited to a multitude of operations that cannot be performed on throatless machines. For utmost convenience, work can be fed in either direction with the same clockwise cranking.

(For Convenience Circle Index Code 1002)

NEW AUTOMATIC SHIFTING SHUTTER

The Eastman Kodak Co. has just developed a new shutter for Kodascope Pageant Projectors, which shifts automatically between two- and three-bladed positions, and provides increased screen illumination while retaining freedom from flicker during showing of both sound and silent motion pictures.

Called the "Super-40 Shutter," the Kodascope Pageant becomes a truly all-purpose machine. Equipped for both sound and silent projection it is capable not only of projection under *normal* conditions, but for use also under difficult conditions of illumination, in hard-to-darken rooms, in large halls, and wherever additional screen brilliance, extra-long projection throws, or unusually large images are required.

The design feature of the new Shutter makes possible the automatic shift between two- and three-bladed positions as shown in the illustration. The new development gives increased screen illumination while retaining freedom from flicker during the showing of either sound or silent motion pictures.

(For Convenience Circle Index Code 1003)

DIAL SAW AND HOLE CUTTER

Erwood, Inc., are marketing the new Dial Saw and Hole Cutter, Model No. 200.

This tool is specially designed for the carpenter, cabinetmaker, and hobbyist working in wood, plastics, and light metal.

Having a ¼-in. shank the tool fits the chuck of the homemaker's electric drill.

Dial Saw and Hole Cutter, Model No. 200

This new tool cuts holes any size from 1⅛ to 2½ in. in diameter. Like previous models it is quickly adjustable to the size you want. It is also an efficient rotary planer and grooving tool when working with any kind of wood.

Made of high alloy steel with pilot drill and cutters of high speed steel, the finish is rust-resisting black gun metal with dial numbers and indicator lines deeply inlaid with aluminum.

Cutters are readily replaceable.

(For Convenience Circle Index Code 1004)

NEW STYLE NO. 37 "JORGENSEN" BAR CLAMP

"Style No. 37" is the newest member of the "Jorgensen" family of steel bar clamps. It is very light in weight, and features the new design "extended" Multiple Disk Clutch for easy and convenient release after clamping. Finger pressure on the clutch, either above or below the clamp bar, releases the sliding head for instant adjustment. The clutch grips the bar automatically any place on the bar, is simple and fool-proof in construction.

Capacities range from 6 to 24 in., and all sizes "reach" 2½ in. from the bar. Complete details are available from the manufacturers, Adjustable Clamp Company.

(For Convenience Circle Index Code 1005)

NEW PHILLIPS SCREW-DRIVER SET

Many a Phillips screw-driver tip has been ruined when trying to turn a hardened self-

(Continued on page 40A)

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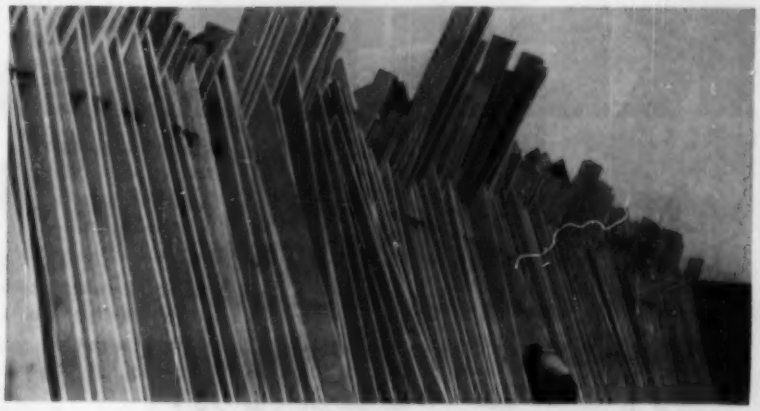
THE QUALITY PATTERN LUMBER THAT STAYS STRAIGHT!



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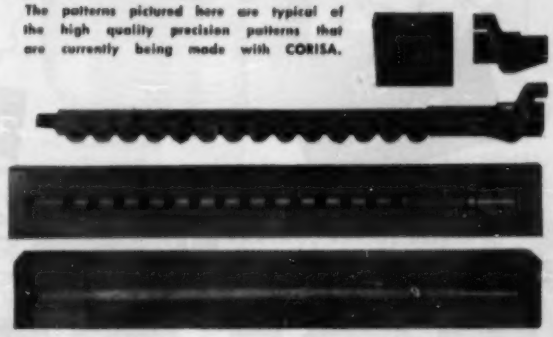
- 1. Carves readily, both with and against the grain.
- 2. Is dimensionally stable even in thin-shelled patterns.
- 3. Costs less than other lumbers of comparable grade.
- 4. Offers more usable lumber per dollar.
- 5. Takes coatings well.
- 6. Is cut thick — in most cases an 8/4 board will produce a 2" planed board.
- 7. Is kiln-dried to proper moisture content.
- 8. Takes abuse even in steel foundries.
- 9. Contains a high percentage of quarter sawn stock.
- 10. Is available in a variety of grades to suit practically any type work and purse, from one board to a carload, in thicknesses of 4/4, 5/4, 6/4, 8/4, 10/4 and 12/4.

The patterns pictured here are typical of the high quality precision patterns that are currently being made with CORISA.



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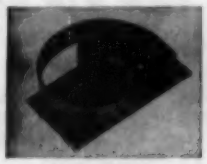

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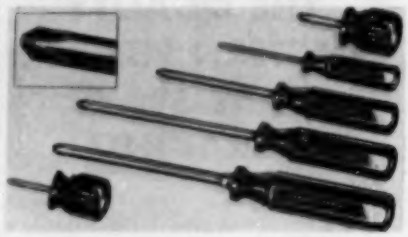
SHOP EQUIPMENT NEWS

(Continued from page 38A)



Phillips Screw-Driver Set

tapping screw. Now a set of specially hardened Phillips screw drivers is manufactured by the Snap-On Tools Corporation, which eliminates this problem.

The high grade alloy steel blades are given a special heat treatment which results in great wear-resisting qualities and increased tip life. The blades are chrome plated to eliminate the problem of rust and provide an attractive appearance.

The handles are tough, shock-proof, black plastic which is practically unbreakable. Their hexagon shape prevents them from rolling when they are laid down and provides a powerful turning grip without hurting the hand.

The sizes available in this new set are:

Bit No.	*Blade Length*	*Blade Diameter*	*Over-all Length*
1	1 in.	5/16 in.	2¾ in.
2	1½ in.	¼ in.	3¼ in.
1	3 in.	5/16 in.	5⅞ in.
2	4 in.	¼ in.	7¾ in.
3	6 in.	5/16 in.	10¼ in.
4	6 in.	⅜ in.	10¾ in.

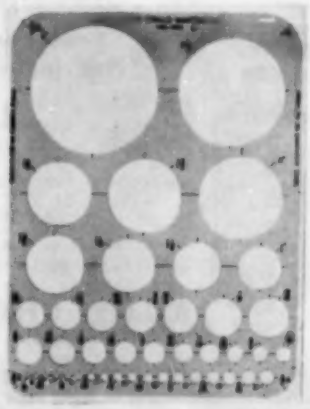
(For Convenience Circle Index Code 1006)

ALVIN'S NEW CIRCLE-MASTER TEMPLATE

Alvin has recently announced a quick-to-use template for drawing circles. It is made of rigid, durable, nonglare Acrylic Vinyl Plastic, and contains 44 precision milled circles to speed the work of draftsmen, engineers, architects, designers, artists, students, instructors, navigators, surveyors — in fact, anyone who needs to draw neat, accurate circles.

The circles are grouped in progressive sizes on the template in 64ths. Circle diameter sizes

(Continued on page 42A)



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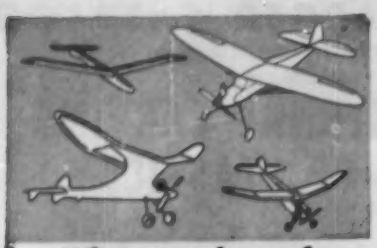

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SHOP EQUIPMENT NEWS

(Continued from page 40A)

are from 1/16 to 1 1/32 in. in increments of 1/64 in.; from 5/8 to 5/4 in. in increments of 1/32 in.; from 1 1/16 to 1 in. in increments of 1/16 in.; from 1 1/8 to 1 1/2 in. in increments of 1/8 in.; from 1 3/4 to 2 in. with an increment of 1/4 in.; and from 2 1/2 to 3 in. with an increment of 1/2 in. All 44 circles make allowance for pencil clearance of 1/32 in. In addition, the four corners of the template are precision cut to give radii of 5/8, 3/4, 7/8, and 1 in. diameters.

(For Convenience Circle Index Code 1007)

NEW UTILITY WORKBENCH

Benchcraft, Inc., has developed a series of steel workbenches. These benches have a heavy gauge top, sturdy truss-type legs which

Benchcraft Utility Workbench

make them very rigid, and they are available with tops made of steel, pressed wood, maple, and with 12-in. shelves if so desired.

Component parts for heavy benches, such as bench drawers, 12- and 18-in. shelves, back and end stops also can be ordered.

(For Convenience Circle Index Code 1008)

BOICE-CRANE SPINNING KIT

A complete metal spinning kit which will enable anyone who has available a 10-in., 11-in., or 12-in. lathe to teach or practice the craft has just been developed by Boice-Crane Company.

Metal Spinning kit

It includes all the elements necessary to being actual metal spinning. Available only through Boice-Crane dealers, the kit comprises two spinning faceplates, five spinning tools, a spinning T rest, ball-bearing back center, one dozen assorted aluminum disks, two turned spinning forms or chucks for spinning an ash tray and a utility cup, a package of Johnson's stick wax for lubricating the spinning chucks, and two industrial-arts textbooks, one a course of instruction in the metal spinning craft and the other a project book.

(For Convenience Circle Index Code 1009)

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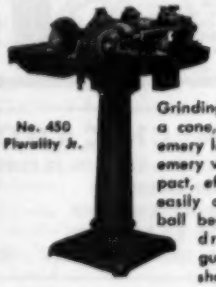

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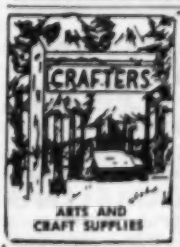

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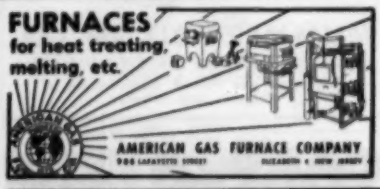

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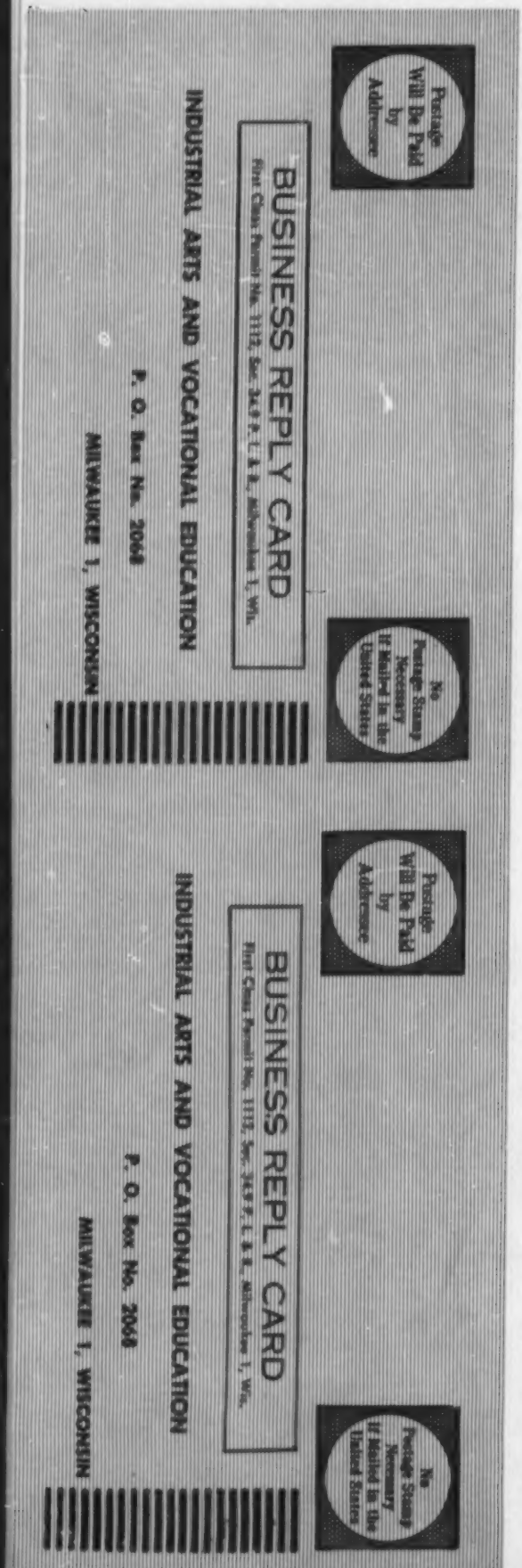
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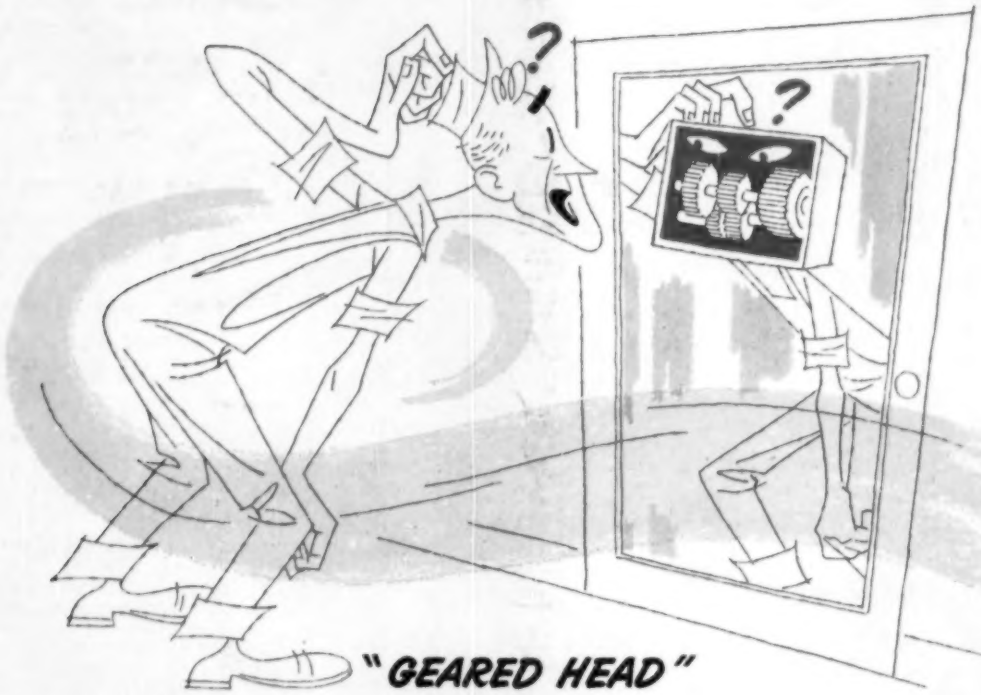

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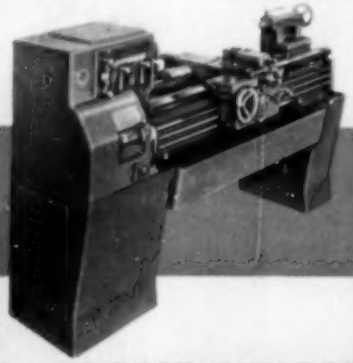

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